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MAKE KNOWLEDGE MANAGEMENT PAY
Start small and remember: less is more
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IN THE CUSTOMER LOOP
CIOs can win points (and justify budgets) by getting close to their companies' customers
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I.T. IN THE AGE OF OUTSOURCING

A NEW GAME PLAN

What Will Stay, What Will Go, How to Leverage What Will Be Left

BY CHRISTOPHER KOCH
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PLUS

EDUCATING TOMORROW'S I.T. STAFF
Schools scramble to combat falling enrollment and respond to CIO needs Page 54

Blue Cross Blue Shield of Kansas City CIO Kevin Sparks is changing his IT department before the business changes it for him.

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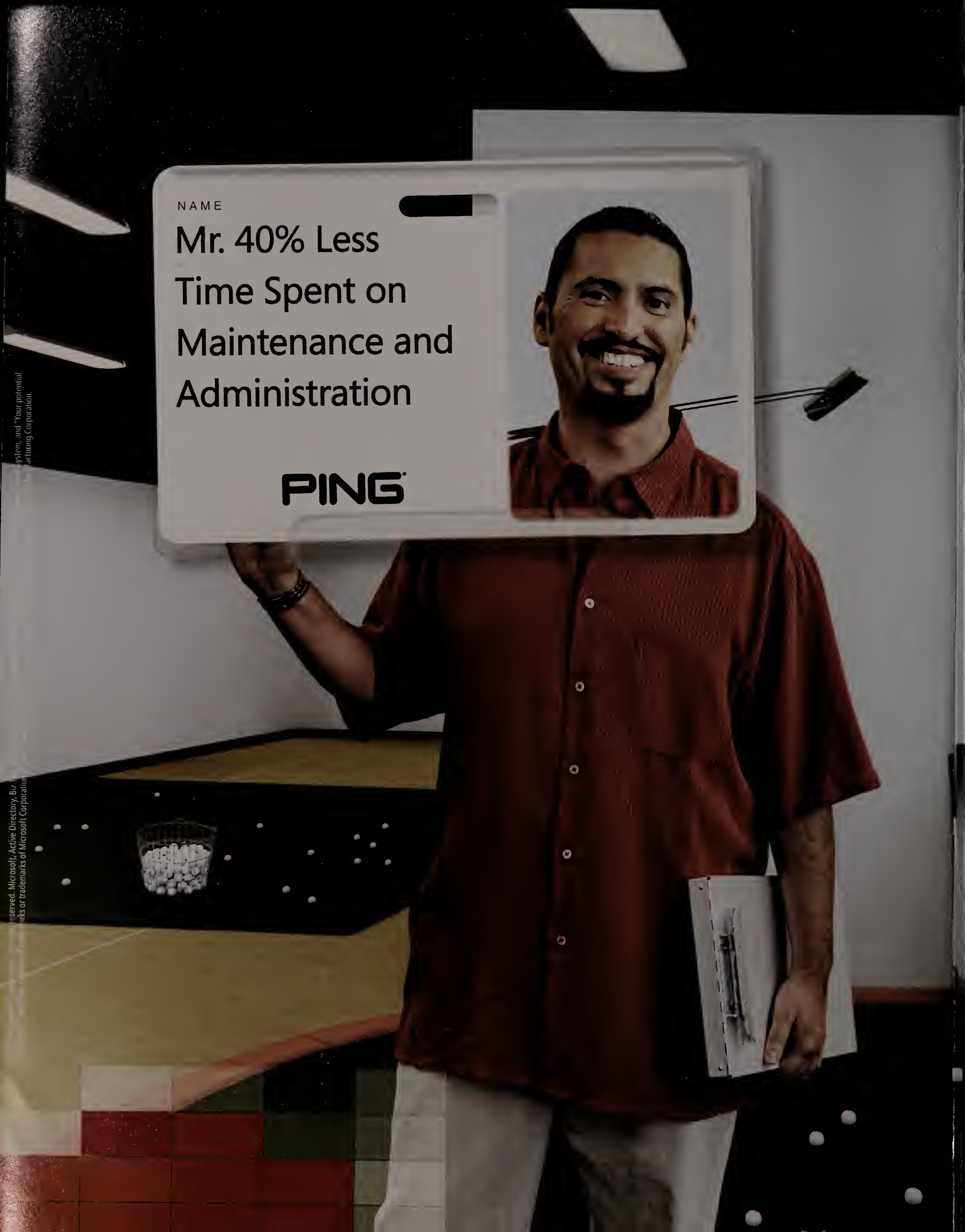
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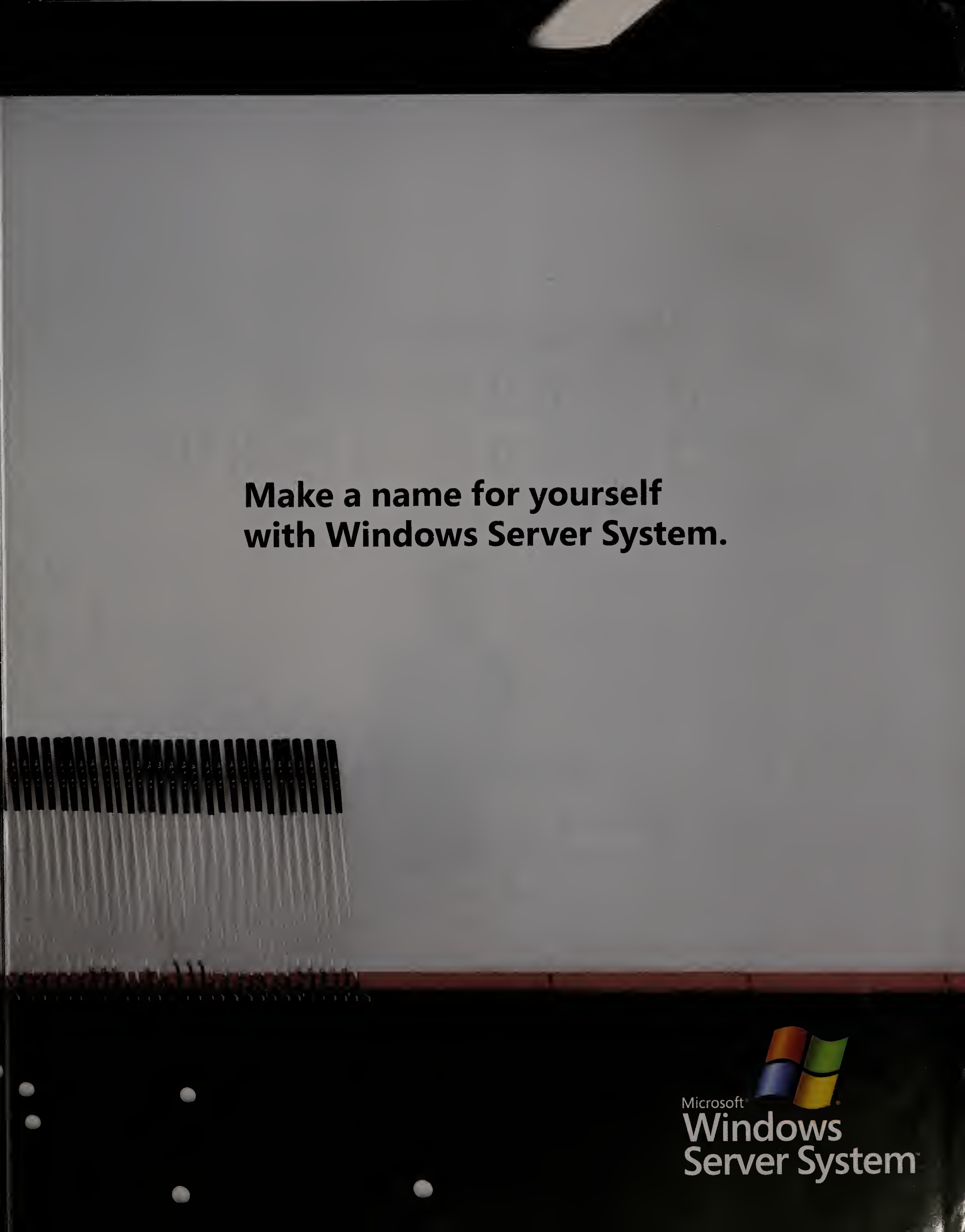

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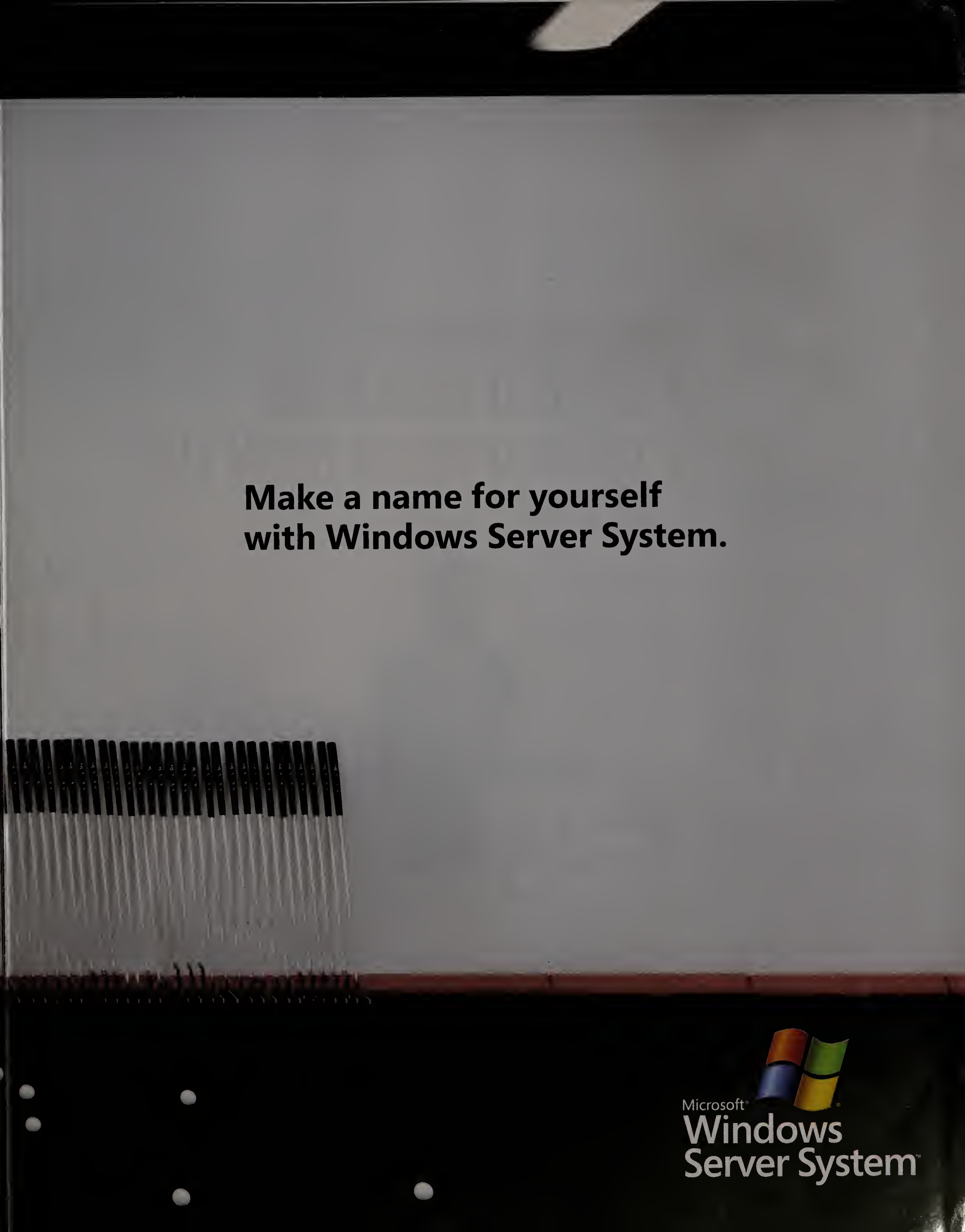

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CIO

VOL. 18 • NO. 2 • OCTOBER 15, 2004

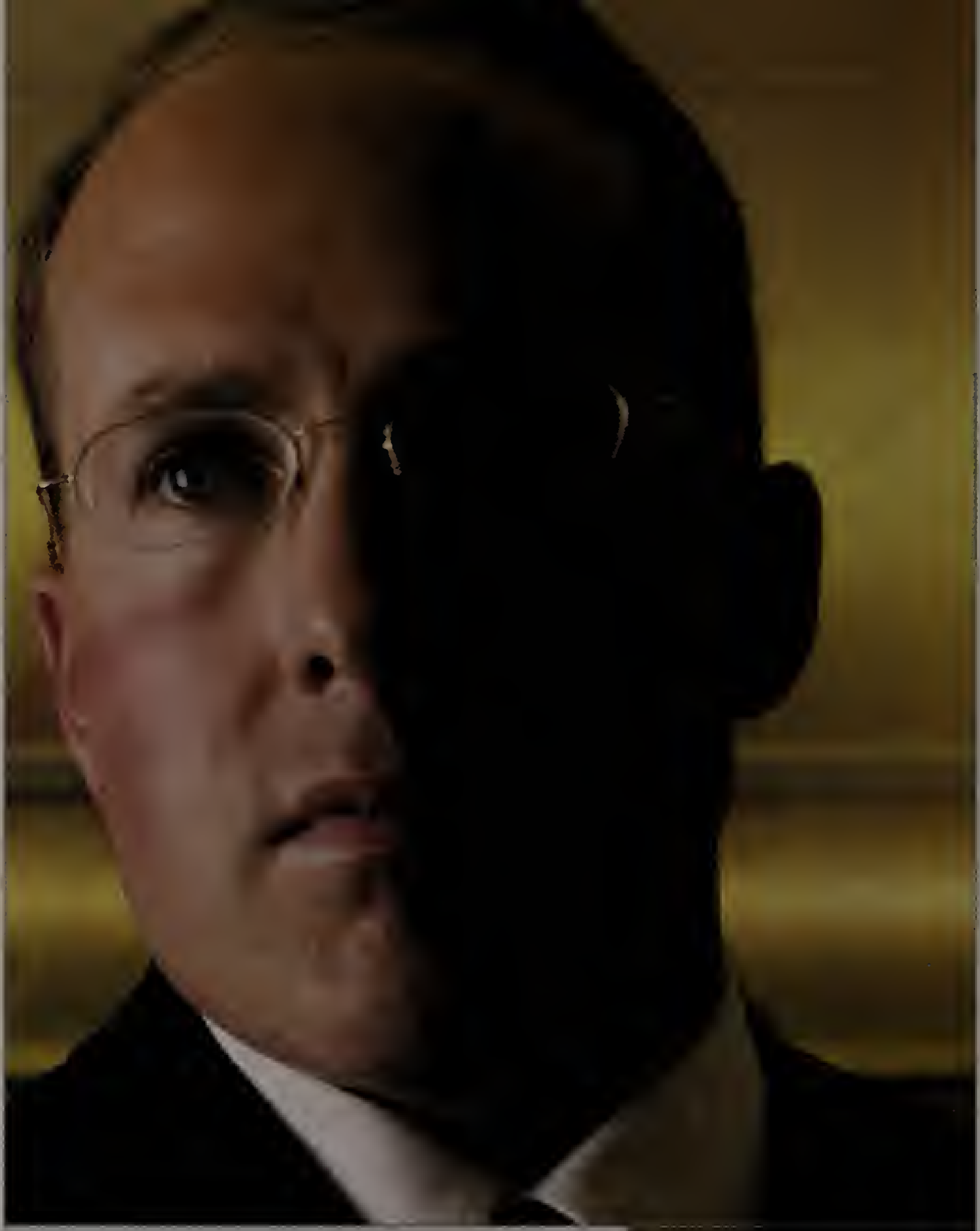
Cover Story

I.T. STAFFING | 44

How to Outsource-Proof Your IT Department: A New Game Plan

CEOs increasingly believe that sending IT work offshore will magically reduce costs and increase productivity. To combat this outsourcery, CIOs need a little white magic of their own. *By Christopher Koch*

COVER PHOTO BY SCOTT INDERMAUR



"A lot of the decision to outsource has to do with businesspeople not being in touch with what's going on in IT," says Blue Cross Blue Shield of Kansas City CIO Kevin Sparks. CIOs can fix that.

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"The world needs IT people who can cross traditional disciplines," says Maria Klawe, dean of Princeton's School of Engineering and Applied Science.

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Degrees of Change | 54
CIOs say they need employees with business skills to build IT departments that can compete with outsourcers. Yet schools aren't providing this talent. Now, with enrollment in IT programs falling, colleges are beginning to listen.
By Todd Datz

KNOWLEDGE MANAGEMENT
Less for Success | 62
Forget the big bang approach. When it comes to demonstrating the value of knowledge management, a piecemeal strategy works best. *By Alice Dragoon*

CUSTOMER SERVICE
In the Loop | 68
Meeting with customers on a regular basis gives CIOs fresh ideas on how to improve customer service and justify new systems. *By Alice Dragoon*

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Machine Dreams | 76
When software runs inside our brains, what will happen to us? Ray Kurzweil, who helped invent the IT present, explains to Web Editorial Director Art Jahnke how humans fit into the IT future. You may not like it.

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CIO

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Bandwidth Bang for the Communications Buck

As CIOs become responsible for consolidating voice and data, they need to look for ways to save money.
By Galen Gruman

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University of Houston researchers are developing better, "cooler" fuel cells.

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Sarbanes-Oxley regulation has come to town, and IT will never be the same.

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IT plays a huge role in the customer experience these days, and CIOs need to come to terms with that.
By Richard Pastore

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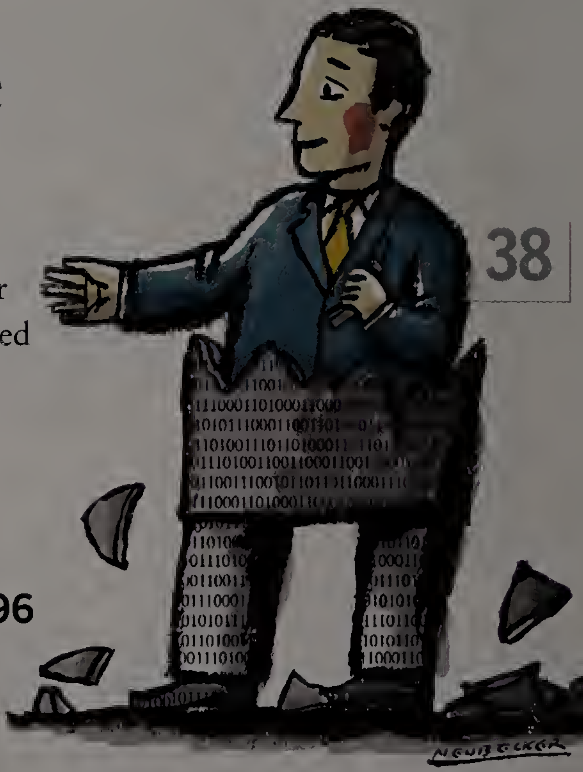

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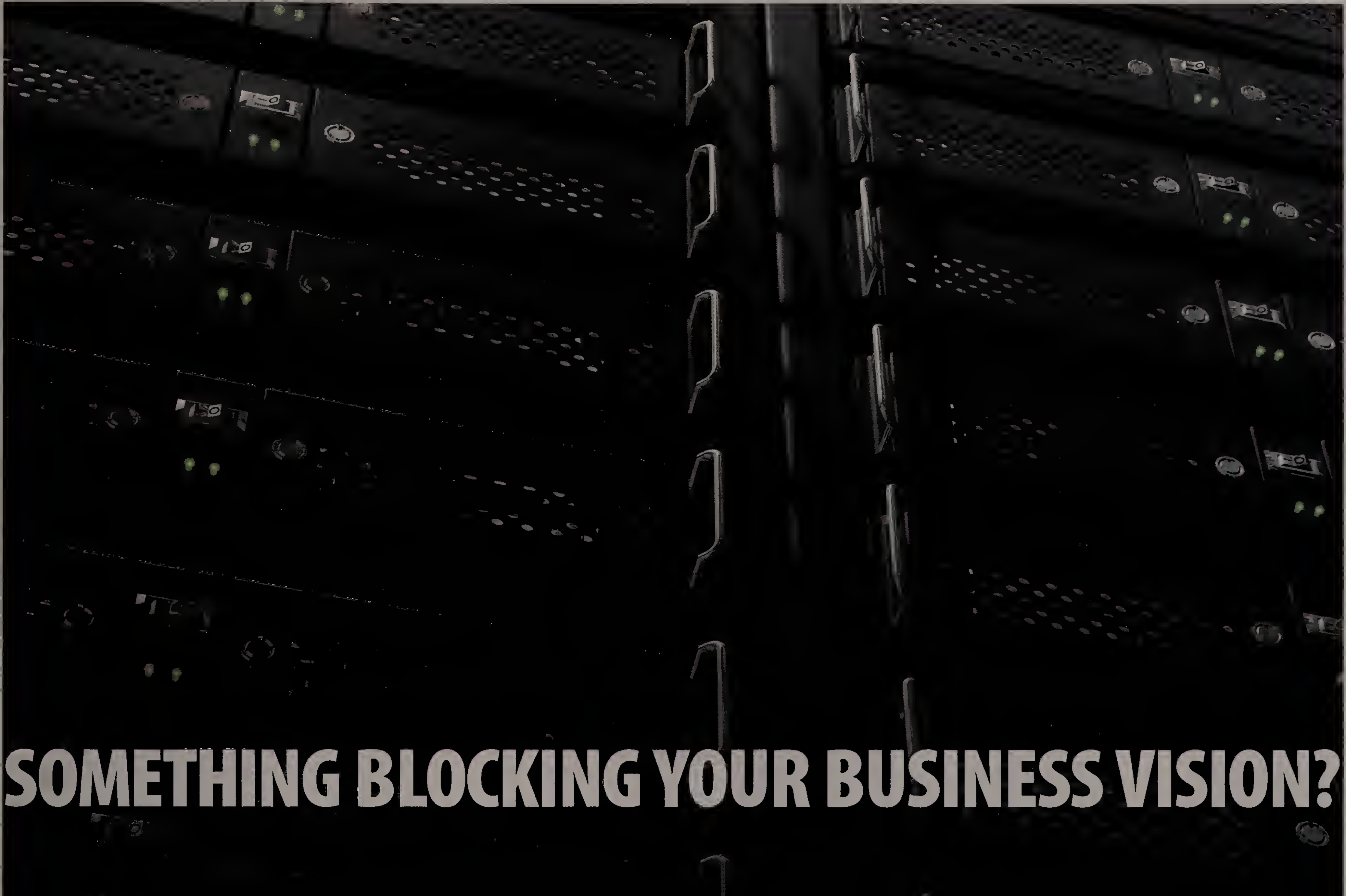

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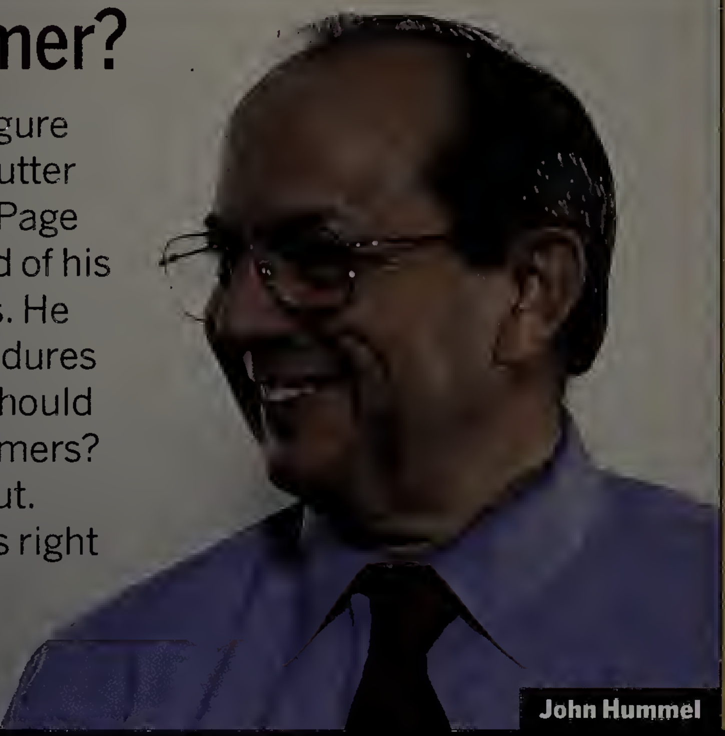
ASK THE SOURCE

Who's Your Customer?

If you don't know, you'd better figure out fast. John Hummel, CIO of Sutter Health, knows (see **In the Loop**, Page 68). He spends more than a third of his time with patients and clinicians. He even scrubs up to observe procedures in the operating room. How far should you go to get to know your customers? Hummel can help you figure it out. He's answering reader questions right now at **ASK THE SOURCE**. Go to *www.cio.com/ask*.



John Hummel

ADD A COMMENT

On Your Guard, CIOs

Responsible adults call it "transparency." The less couth describe it as "bare-naked exposure in compromising positions." Columnist Michael Schrage says the natural extension of SCM, CRM and regulatory compliance is invasion by external networks, databases and software (see **Naked Goes the Enterprise**, Page 34). And guess who'll be held accountable if the costs of transparency outweigh its benefits? The CIO. How will you cover your transparency? Go to the online version of Schrage's column and expose your answers to your fellow CIOs in **ADD A COMMENT**.

GETTING AHEAD

Be a Better Manager

According to a recent CIO.com survey, online readers can't get enough advice and direction on improving their management skills. We offer two ways to get a leg up: Subscribe to the free **Leadership and Management Review** newsletter, written by Leadership and Management Editor Edward Prewitt (to sign up, go to *www.cio.com/newsletters*). And check out the **Leadership and Management Research Center**, where you'll find links to all past articles and columns as well as outside resources to help you be the leader you want to be.

Web Exclusive

Good Blogging

» Technology Editor Christopher Lindquist's **Tech Link Letter** brings you the highlights and picks of the best of the technology blogs that are already out there.

» Web Editor Sandy Kendall's **What's the CEO Reading?** trolls the business press and give you the heads up before the boss does. Find both on the homepage at *www.cio.com*.

COMBAT OUTSOURCERY

Going with Alternatives

Offshore outsourcing is not the answer for everyone (see **How to Outsource-Proof Your IT Department**, Page 44). As IT's traditional currency of value--software code—moves to lower-cost providers, the new emphasis will be on doing all the things that come *before* coding: analysis, design and collaboration. For more ideas and resources to help inform your outsourcing decision, check out the **Going with Alternatives** box of Web links with the online version of this article.

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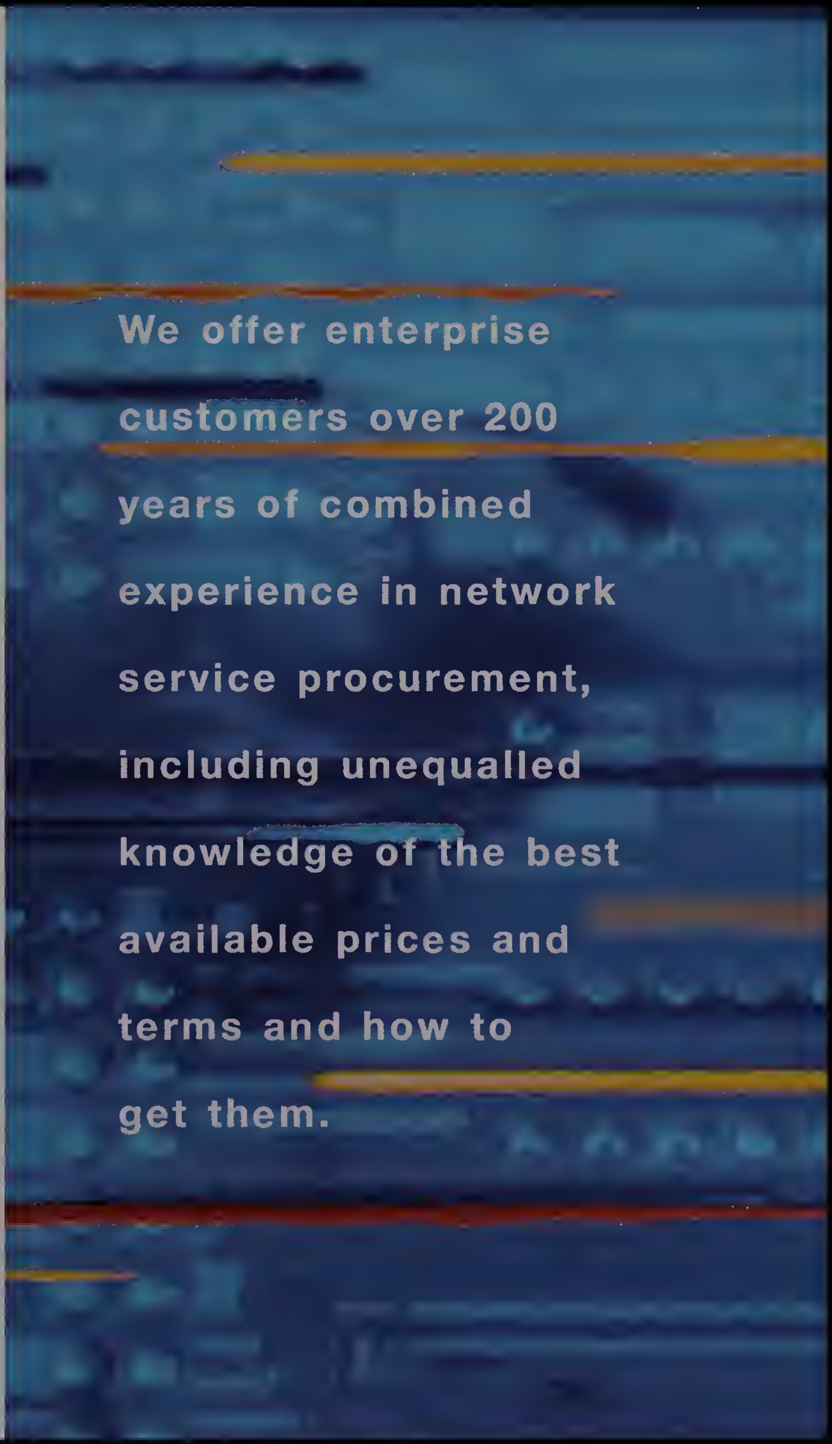

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3. The carrier is baselining your traffic.
4. You're looking for acquisitions to help meet this year's commitments.
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From the Editor

We're always ready for an opportunity to gain constructive feedback. Give us your opinions of how we're doing by taking our online 60-Second Survey. It's quick and anonymous. Find it at *www.cio.com/60secondsurvey.*

Just *Ask* Me!

NOT ONE OF THE COUNTLESS CIOs I've met in my 16 years of covering IT has ever asked me how I found his or her company's service, or what I thought of my "customer experience." Even when they find out that I'm the editor of *CIO*, they don't ask. Maybe they're scared to bring it up. But wouldn't you think it's a ready-made opportunity to gain constructive feedback? Jeez, I ask CIOs what they think of our magazine when I meet them. I even urge them to be critical; it will help improve the magazine.

Perhaps I should prime the pump: Here are a handful of retailers, manufacturers and information providers that I've done business with recently where IT played a big role in my customer experience. I only hope that my experiences—both the good and the bad—could be as much help to their CIOs as the customer insights were to the CIOs in Senior Editor Alice Dragoon's feature, "In the Loop" on Page 68.

Best Buy, Circuit City, Crutchfield and CompUSA: I've bought, returned and repaired innumerable electronic gewgaws from these guys. They always have my data at their fingertips. Even when I've lost my receipt, they know what I bought and when I bought it. Dare I conclude that companies that sell technology have better technology?

Sears: Speaking of repairs, I brought in a Craftsman leaf blower that I bought who knows when, with a yank cord that wouldn't yank. Sears fixed it. And as I reached for my wallet, the lady behind the counter said: "The system shows it's still under warranty. Take it away and have a great day." I did.

Barnesandnoble.com and Amazon.com share a true phenomenon: If you order from either company a book titled *The Playmakers*, a history of the great toy inventors, both will mistakenly send you a board game called *Bible Blurt*. Try it yourself and see. But one company will refund your money a lot faster and easier than the other.

HP and Compaq: After numerous chats with some polite people in India, I got an American call center employee on the phone to talk about why my new HP printer software refused to load on my new Compaq PC. He couldn't help me either.

Keep in touch.

Richard Pastore

Richard Pastore, Editor
pastore@cio.com

2004
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For the second year in a row, *CIO* magazine has won the prestigious Jesse H. Neal National Business Journalism Award for editorial excellence.

PHOTO BY WEBB CHAPPELL

"Secure Web access to our key applications without a single rewrite was, by itself, a huge benefit from using Citrix. In addition, Citrix cut annual telecom costs at our 370 dealerships by 40%."

Joyce Vonada, CIO
AutoNation, Inc.

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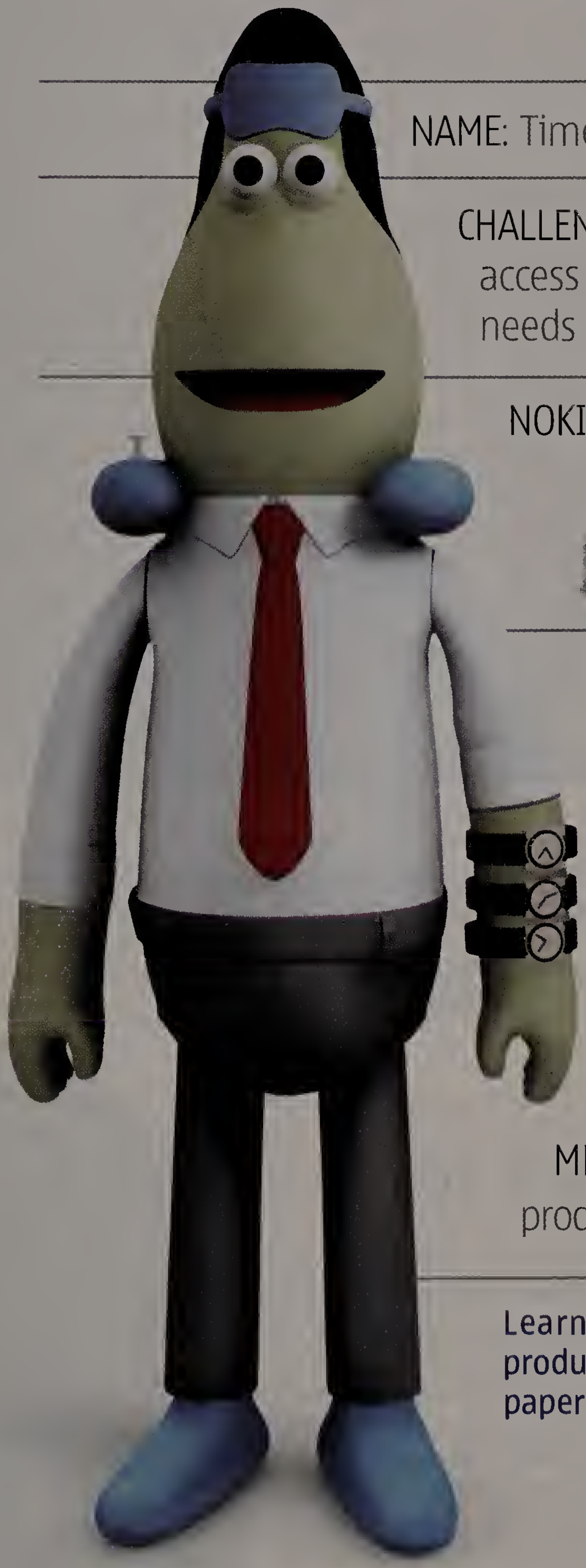

NAME: Time Zone Tim | QUOTE: "Zzzzzzzzzzz."

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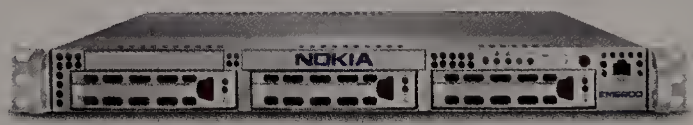

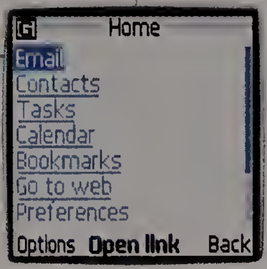

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the NEW the HOT the UNEXPECTED

Edited by Megan Santosus

HEALTH CARE AND I.T.

The Slow Road to Electronic Records

For years, America's large industries have been convinced of the efficiency of electronic records. But the wired revolution has been overlooked by the $1.7 trillion health-care industry, which, for the most part, still uses paper and pen (and doctors' notorious chicken scratch) to record Americans' health.

But the slow adoption of electronic health records (EHRs) may be speeding up. More than 1,500 health-care executives and public health experts gathered in Washington, D.C., in July to attend the National Health Information Infrastructure Conference: Cornerstones for Electronic Healthcare to hear the Department of Health and Human Services unveil a framework to guide discussion on how the U.S. health-care industry can transition from a mostly paper-based system to an electronic one in the next 10 years. The framework includes developing a network that doctors and health professionals could use to share health information to improve health care and reduce the double-digit rate increases in health-care costs. "We have reached the tipping point today—that critical mass where it is acknowledged that technology is here to transform medical care," said HHS Secretary Tommy Thompson at the conference.

The use of EHRs could help reduce the number of patients who die as a result of medical errors—currently as many as 98,000 people each year—and help avoid the incidence of misread prescriptions and adverse drug interactions that affect 770,000 people each year.

Continued on Page 22 »

VIDEO-ON-DEMAND

Words from Beyond the Grave

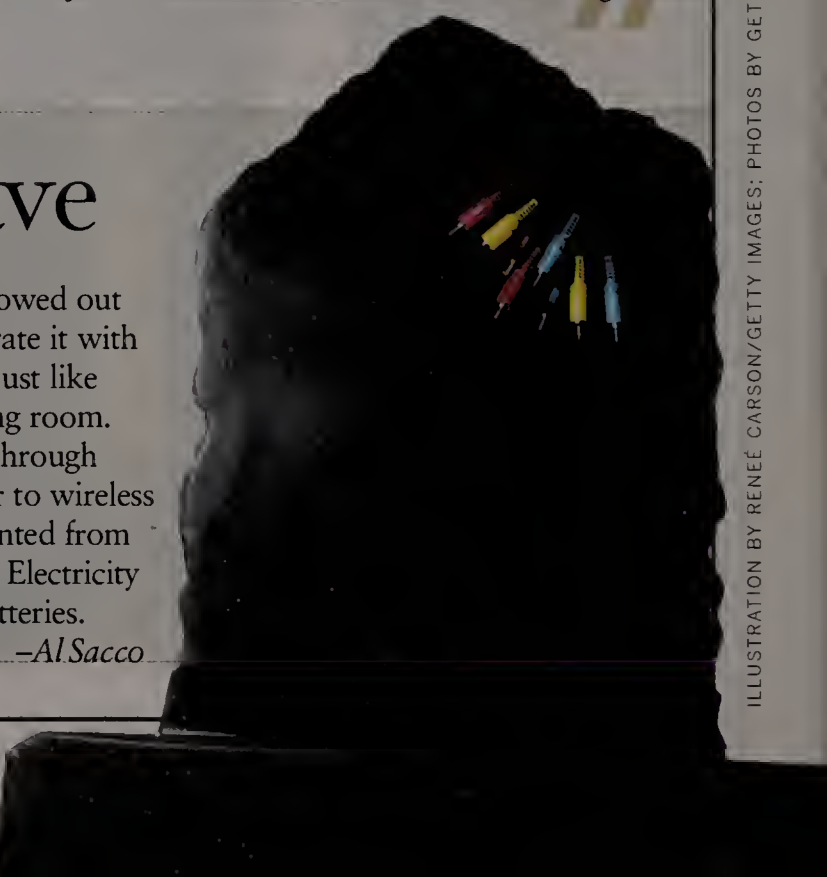
Ever wanted to communicate with the dead? Well, thanks to Robert Barrows, supernatural ceremonies, psychic mediums and Ouija boards may no longer be the only ways you can.

Barrows, an inventor from Burlingame, Calif., recently filed a patent application for the "Talking Tombstone": a hollow headstone that allows the deceased to "speak" (courtesy of a recorded message) from six feet under.

Why a talking tombstone? "Everyone has a story to tell," Barrows says. "And now they'll finally be able to tell their sides of that story."

The concept is simple: Put a video playback device and a TV monitor into a hollowed out headstone and operate it with a remote control—just like the TV in your living room. Sound is delivered through built-in speakers, or to wireless headsets that are rented from the cemetery office. Electricity is via conduit or batteries.

–Al Sacco



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Electronic Records

Continued from Page 20

Cliff Dodd, CIO Kaiser

On the financial side, the health-care industry could save between $78 billion and $112 billion a year, according to HHS.

More accurate health information and tighter cost controls is what Kaiser Permanente, the nation's largest HMO, hopes to achieve with one of the first end-to-end EHR systems in the nation. Once completed, the system will tie together Kaiser's 8.2 million patient records from the labs to the pharmacy. "This promises to have a profound impact on how we deliver health care," says Cliff Dodd, Kaiser CIO.

Kaiser is an exception, however. Only 13 percent of hospitals use electronic records, and 14 percent to 28 percent of physicians are wired, according to HHS. To create a buzz around EHRs, HHS brought big names in the health field to the conference. Besides Thompson, speakers included former House of Representatives speaker Newt Gingrich, who founded the Center for Health Transformation in Washington, D.C., and Senate Majority Leader Bill Frist.

The HHS framework purposefully avoids specifics on how to move the nation's 4,000-plus hospitals and 853,000 physicians to rely more on IT. "This framework is intended to stimulate dialogue," says David Brailer, National Coordinator for Health Information Technology, a position President Bush created this spring. "It leaves a lot open to allow the private sector to fill in."

Some of the blanks will be filled in by a leadership panel made up of Fortune 100 acting and retired CEOs who have no health-care industry experience.

Despite the heightened awareness, the obstacles are significant. For example, Kaiser's system will cost $2 billion over five years, and Dodd says smaller health organizations may have trouble finding the money. Standards present a challenge too. Lifespan, a system of four hospitals in Rhode Island, has 800 of the nearly 3,000 doctors who have an affiliation with its hospitals using Lifelink, the hospital group's patient network. Rhode Island has applied for a federal grant to test a statewide medical records system, which would connect Lifelink to other hospital systems. Lifespan CIO Carole Cotter says the hospital group could demonstrate the scalability of a system to the state, but without standards, it's difficult to go beyond statewide borders.

But the public may pose the biggest obstacle. Stephanie Reel, CIO at Johns Hopkins Medicine, says convincing Americans that their medical information will be protected must be accomplished prior to wide-scale deployment of EHRs. But, say privacy advocates, HHS has not given assurances that its leadership panel will include privacy officials. "I think there is room for improvement," says Emily Stewart, a policy analyst for the Health Privacy Project in Washington, D.C.

But convincing the health-care industry to use EHRs will take work. The U.S. Government Accountability Office released a report in August concluding that various privacy and security laws, as well as malpractice, tax and state licensing laws, to name a few, contribute to the reluctance of doctors and health organizations to embrace IT. "HHS's efforts to address these barriers had been limited in scope," the GAO report stated.

–Allan Holmes

CORPORATE TURNAROUNDS

Using IT to Restore Credibility

When John Bruno left Cisco to become Symbol Technologies' CIO in fall 2002, he did so with his eyes open. The Securities and Exchange Commission was investigating Symbol's accounting methods, and the CEO and other top execs were let go as a result. Symbol's board, though, assured everyone that the financial shenanigans were a thing of the past.

But lightning would strike twice. Just months after Bruno moved from California to Symbol's headquarters on Long Island, another accounting scandal surfaced for the bar-code device maker. A finance manager attempted to conceal several million dollars in expenses on 2002's books. Apparently, there were more rooms of the house to clean.

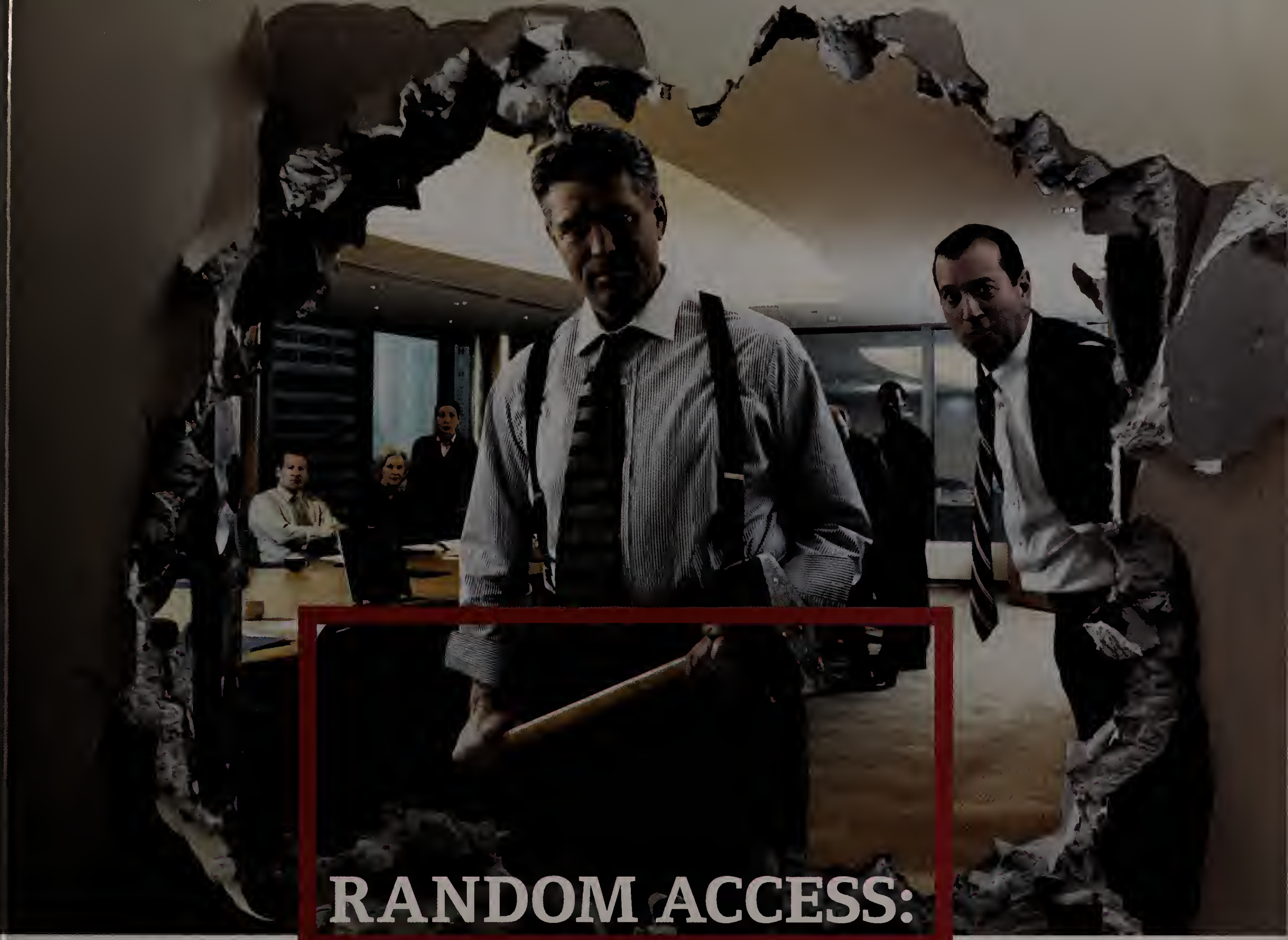
Bruno, however, was undaunted. He arrived at Symbol to help transform the company, something that could not be accomplished without overhauling IT. "We didn't have an IT landscape," he says. The company had a little-used, out-of-date ERP system; no policies for system architecture, data center management or security; over 250 system interfaces; no system of records for order and sales management; a financial side in desperate need of IT controls; and demands for more than 100 high-priority projects. Needless to say, overall IT management left a lot to be desired.

Bruno has spent the past two years trying to rectify the chaos. He has invested $110 million in IT to centralize order and inventory management, build an online forecasting system to manage demand and inventory, roll out a CRM system to build rigor into the sales processes and pricing models, upgrade SAP functionality, install audit and compliance processes into finance, and more. "When we come out the other side, this landscape will be a showcase to others for financial controls and business compliance," says Bruno.

Bruno, as CIO and senior vice president of corporate development, is also heavily involved in Symbol's recent $230 million acquisition of RFID player Matrics—a testament, he contends, to the importance of the CIO role. *–Thomas Wailgum*

John Bruno became CIO of Symbol Technologies in the wake of an accounting scandal.

PHOTO TOP BY RICHARD TAUBER



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By the Numbers

By Jon Surmacz

To Understand Is to Sell

By focusing on strategic business goals and understanding finance, CIOs stand a better chance of selling their technology projects

Can technologists and financial executives agree on which projects to fund without driving one another crazy? The answer, increasingly, is yes, according to a recent survey of 157 business and IT managers by Cutter Consortium. The survey found that, in contrast to historic perception, CIOs and CFOs are indeed seeing eye to eye on funding technology initiatives these days, in large part because they are speaking the same language. According to the survey, 70 percent of respondents said that business cases for technology projects focus on financial, not technology-based metrics. The increased attention CIOs are giving to financial metrics is paving the way for better communication, stronger relationships and, in turn, better odds for getting technology projects funded, according to the survey. A whopping 72 percent of respondents said their CIOs and CFOs have good relationships. The reason? CIOs have finally wised up, says Steve Andriole, senior consultant at Cutter Consortium and professor of business technology at Villanova University. In the early part of the decade, CFOs viewed IT as a cost center and began nixing projects that neither cut costs nor improved the bottom line. Operational metrics such as network availability or uptime didn't mean a thing to CFOs, unless CIOs could demonstrate that an unreliable network had a direct impact on the business. And that's exactly what CIOs have learned to do. "A lot of things have happened over the last two or three years," says Andriole. "There's a reluctance to spend on anything, let alone IT. CIOs had to adapt. CIOs have tilted toward the business."

By focusing on business metrics, and then divorcing themselves from day-to-day technology tasks, CIOs can reposition themselves as strategic leaders of the business and join other business leaders in executive strategy sessions, says Andriole.

"When you're involved in those strategy sessions," says Andriole, "then you've made it."

Best Practices

1. **Bifurcate your technology into an operational branch and a strategic branch.** Develop best practices around acquisition, deployment and support of operational technologies (infrastructure, databases, applications). Delegate management of operational technology.
2. **Build credibility with the CFO by demonstrating the cost reduction and efficiencies gained through management of operational IT.**
3. **Focus strategic technology around growth, profitability, market share and so on.** Develop a set of metrics that speaks directly to the business.

For more on the secrets to a CFO's heart (and mind), check out the Money issue at *www.cio.com/money*.

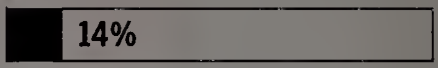
72% of business and IT managers say their CIOs and CFOs have good relationships because they communicate well.

If you **understand financial metrics**, you'll be able to sell your projects.

76% of respondents said their CIO/CTO understands corporate financial metrics well/fairly well.

64% of respondents said their CIO/CTO sells technology projects well/fairly well to financial managers.

If you **don't understand financial metrics**, you won't.



14% of respondents said their CIO/CTO understands corporate financial metrics poorly.

19% of respondents said their CIO/CTO sells technology projects to financial managers poorly.

SOURCE: Cutter Consortium

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WIRELESS NETWORKS

Better Grapes Through Technology

Cris Strotz at Pickberry's mountainside vineyard

Vineyards aren't the typical proving grounds for cutting-edge technologies, but California's Pickberry Vineyard became just that when it installed a wireless sensor network to monitor its grapevines.

Pickberry specializes in grapes for high-end wines, and making sure that each year's crop lives up to "premium" standards is difficult. Small variations in moisture, temperature and soil quality affect the health of the vines and influence whether the grapes are worthy of top-notch wines.

To control these variables, Pickberry has begun using wireless sensor technology; with the help of the consultancy Accenture, the company combined miniature sensors, two-way wireless communications and back-end business software into what it calls "sensor telemetry."

"It's not enough to simply sense things," says Bill Westerman, an associate partner at Accenture. "You have to gather intelligence in the field and transform it into business insights." Pickberry's grape-grower, Cris Strotz, notes that the vineyard now gets that kind of information in three months, where before it used to take three or four years to gather.

For instance, Pickberry may gain a better knowledge of when and how to water the crops. Watering must be precise to get the best results. Too little water is bad, but too much makes grapevines susceptible to mold. Moreover, Pickberry's vineyard covers a mountainside. "In this type of grape growing, you're dealing with fine-grained microclimates," Westerman says. "The upper vines experience a cooler, drier climate, while the lower sections have water-drainage issues."

The sensors continuously monitor humidity, wind and water, as well as soil and air temperature. Data is then communicated via a wireless-mesh network to an onsite PC. The PC aggregates the information and transmits it back to Accenture over a cellular uplink, after which Pickberry can access reports and graphs through a Web portal. Pickberry is also alerted when conditions demand immediate attention, such as with frost.

Two startups, Millennial Net and Ember, are at the forefront of embedded wireless sensor technology. Millennial Net supplied the wireless sensor components for the Pickberry project. Mark Pacelle, Millennial's vice president of marketing, points out another important consideration for these networks: power consumption. If you have to manually change batteries all the time, the network loses much of its value, so Millennial has developed low-power sensors that use tiny batteries that last up to 10 years.

According to Ember CTO Robert Poor, embedded wireless networks will become commonplace in applications such as building automation in the near future. "Ultimately, these networks are only doing their jobs when they're invisible," Poor says. In other words, when an air conditioner in a hotel turns itself off because the guest has checked out, then the network is working well. No one notices anything other than the lower electric bill.

–Jeff Vance

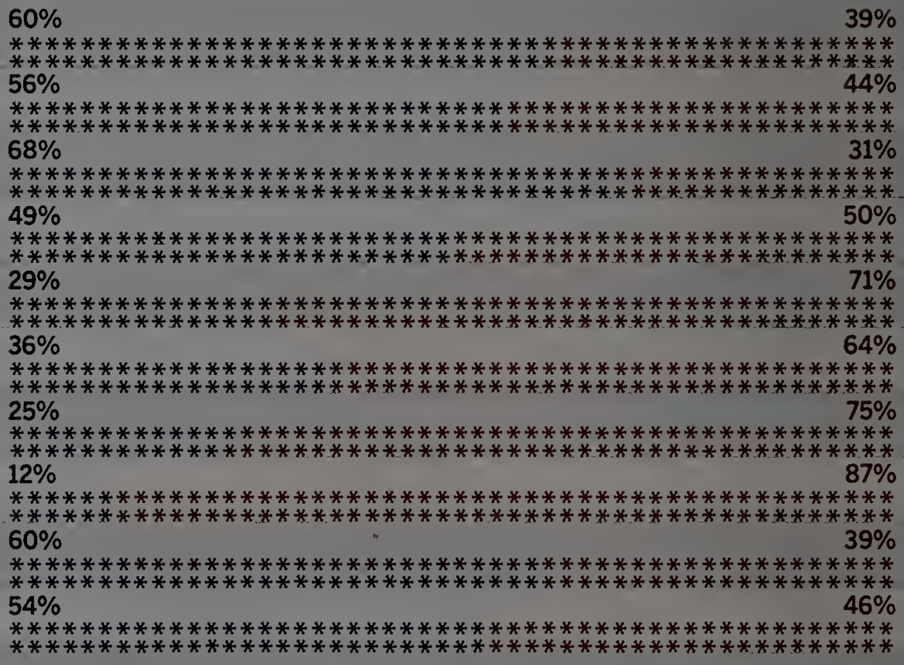
THE 2004 PRESIDENTIAL ELECTION

Campaign Contributions: Who Gave, Who Got

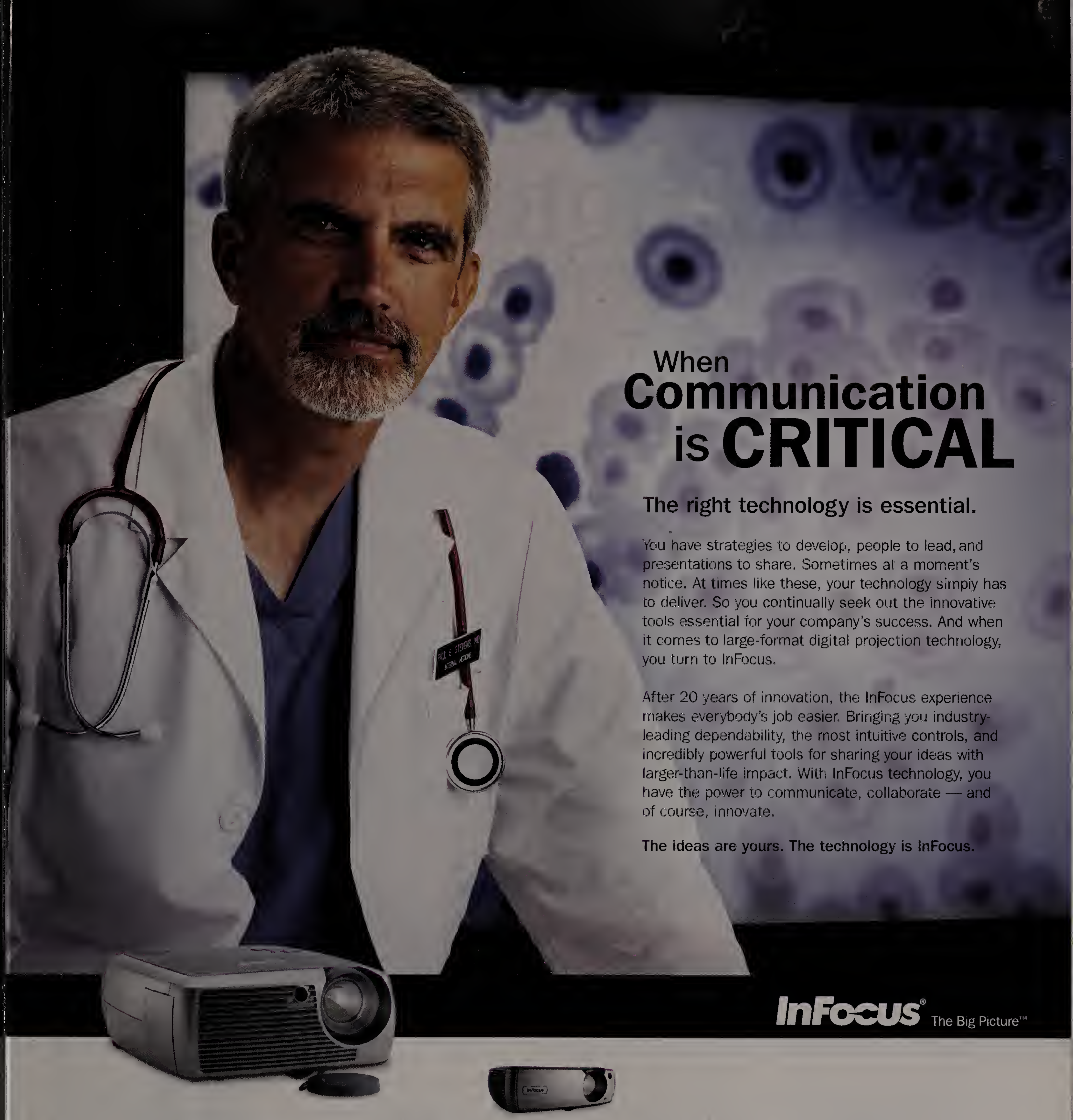
With less than three weeks to go, the presidential race will soon be decided. Perhaps then the fund-raisers—who have been on overdrive—will take a well-deserved break. From the computer and Internet industries, the campaigns collected more than $17 million by Sept. 13. That total represents contributions from both political action committees associated with companies and individuals who work at those companies. Here are the top 10 companies with the deepest pockets and the breakdown as to which of the two parties got their money.

* Democrats * Republicans * Other

1.	Microsoft	$2,165,755	60%	39%
2.	Cisco Systems	$572,524	56%	44%
3.	IBM	$402,050	68%	31%
4.	Intel	$376,239	49%	50%
5.	EDS	$323,071	29%	71%
6.	Siebel Systems	$294,350	36%	64%
7.	Dell	$256,912	25%	75%
8.	EMC	$238,275	12%	87%
9.	Hewlett-Packard	$224,341	60%	39%
10.	eBay	$213,026	54%	46%



SOURCE: Opensecrets.org



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Washington Watch

Edited by Elana Varon

DHS to Deploy IT for U.S. Border Checks

Officials aim to tighten security without delaying trade

This fall, the Department of Homeland Security plans to implement key portions of two information systems designed to tighten security at U.S. borders, while still easing the movement of people and goods across the borders. How successful DHS is in deploying these systems could have an impact on trade, with 500 million people and a projected $1.4 trillion worth of imports coming into the United States in 2004.

By November, truckers entering the United States at 40 border crossings will be required to have an EDI system on board that will send information about their cargo to customs agents at least one hour before the truck arrives. By mid-January, this capability is scheduled to roll out at another 59 ports. (For a complete list, visit *www.cio.com/printlinks*) Customs agents will check the truckers' information against government, commercial and law enforcement databases. If they flag something suspicious, the truck may be pulled over for closer inspection at the border.

Truckers say they're ready. Millions of trucks cross the Canadian and Mexican borders every year, carrying goods valued at about $240 billion. Because many trucks already have the necessary equipment, trucking officials believe the transition will be smooth. "Now [crossing the border] will be a little more efficient," says Phillip Winter, spokesman for the National Truckers Association.

Another system, the U.S. Visitor and Immigrant Status Indicator Technology program (US-Visit), which tracks foreign visitors entering and leaving the United States, also faces a key milestone this winter: a Dec. 31 deadline for collecting biometric identification at land borders. The Government Accountability Office warns that DHS has fallen behind in its testing of the early systems for entry, and future testing delays could raise the possibility that the system will not operate properly because the next phase is more complex.

Scott Hastings, CIO for US-Visit, says that a few seconds' delay in processing every visitor at land borders could have a huge effect on the economy. Just how much is unclear; Purdue University economist David Hummels, who studies international trade, says the costs include irritation and the possibility that business executives forgo face-to-face meetings, he says. *–Allan Holmes*

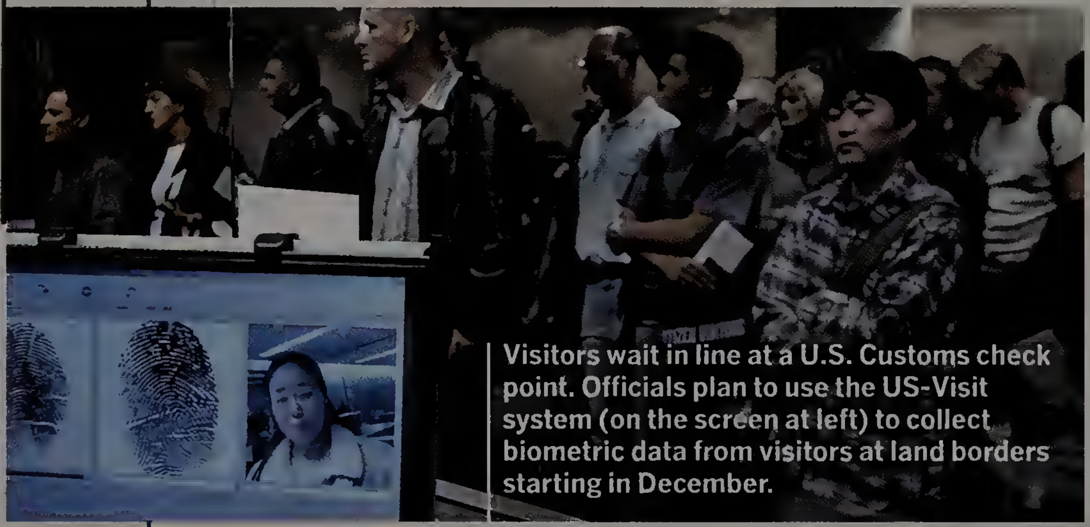
Visitors wait in line at a U.S. Customs check point. Officials plan to use the US-Visit system (on the screen at left) to collect biometric data from visitors at land borders starting in December.

PHOTO BY MARCIO JOSE SANCHEZ/AP/WIDE WORLD PHOTOS

Corporate Tax Bill Targets Technology

Tax breaks on tap for offshoring, R&D, equipment donations

A HOUSE AND SENATE conference committee is meeting this fall to reconcile competing versions of a corporate tax bill, the American Jobs Creation Act of 2004 (H.R. 4520). The technology-related items are mainly extensions of current law. An exception is provisions that may make it more worthwhile to send IT work offshore.

Outsourcing: Offshore labor figures into three provisions. One in the House bill would simplify the way U.S. companies claim credit for taxes paid in foreign countries. Another would classify software as a manufactured good, allowing software companies to claim a manufacturing tax break.

Republicans say all this is good for the economy because it encourages free trade, but Democrats argue that the provisions would encourage companies to send more work overseas. Software companies, for instance, could increase profits by outsourcing development of components and shipping the product from the United States. Tax lawyer Len Schneidman of Foley Hoag says the effect of both provisions on offshore outsourcing would be indirect.

A third provision, in the Senate bill, would restrict offshoring by prohibiting U.S. government contractors from using overseas labor.

Research and development: Both the House and Senate bills would extend, for the 11th time, a tax break worth up to 20 percent of qualifying R&D expenses that expired on June 30. Business groups want to make the credit permanent, but lawmakers don't want to commit to the cost—up to $9.8 billion over 18 months.

Donating computer equipment: The House bill would restore a deduction for donations of computer equipment to schools or public libraries and extend it until Dec. 31, 2005. The provision would save companies an estimated $23 million annually. *–Grant Gross*

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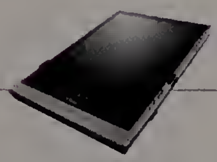

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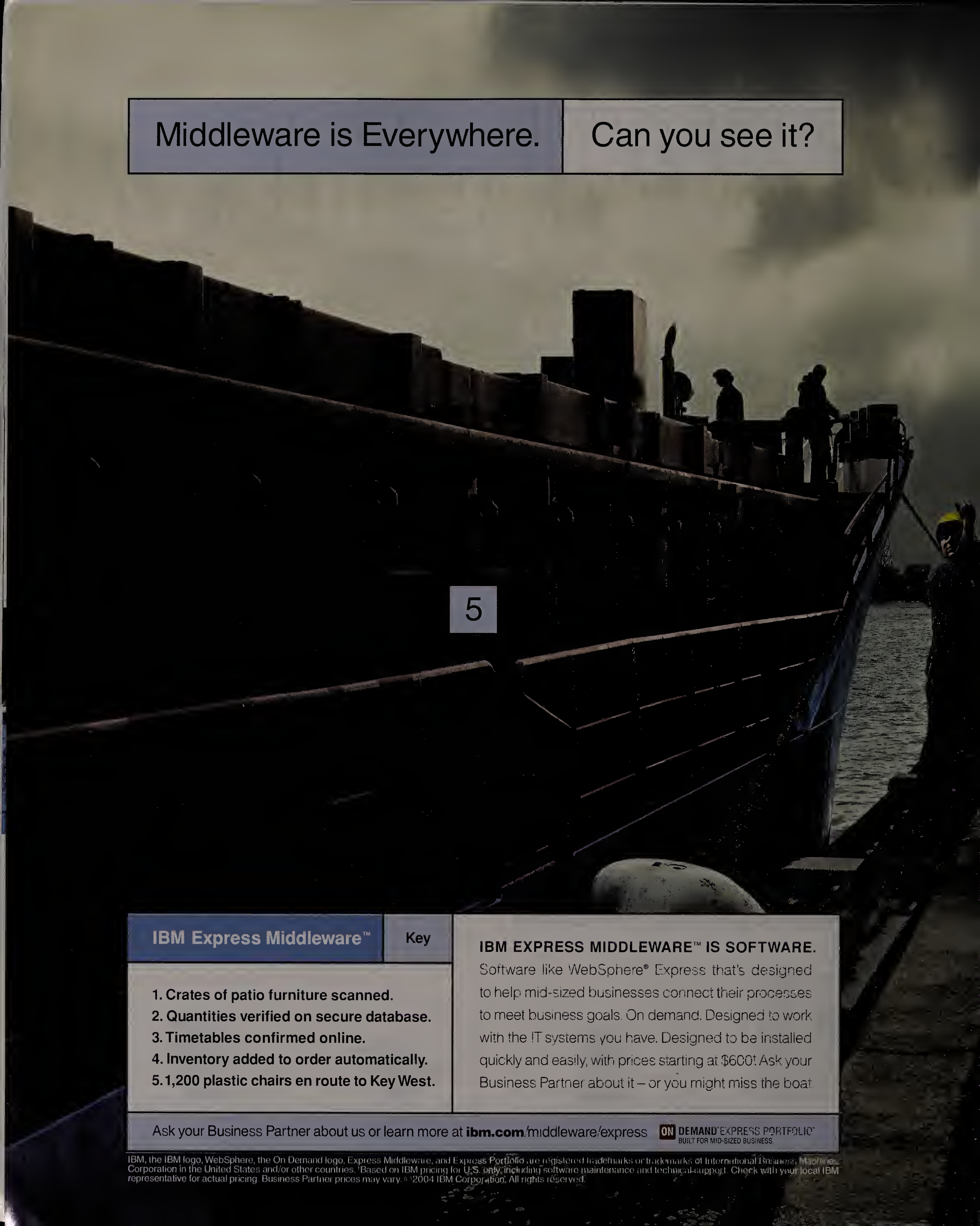

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the Exchange

By Martha Heller, Director, CIO Executive Council

WORDS OF WISDOM FROM THE **CIO EXECUTIVE COUNCIL**

How to Demonstrate IT Value to the Business

Members of the CIO Executive Council offer nine tactics for putting your IT cards on the executive table

IT'S BEEN SOME 50 YEARS since IT was introduced to the business, and CIOs are still struggling to demonstrate its direct relationship to a company's financial performance. We asked five members of the CIO Executive Council for their advice on how to pull IT out of its black box and place it squarely on the executive table.

1 **SHOW YOUR FACE.** "Once you make it to the table, you have to start operating like an 'O,'" says John Hummel, CIO of Sutter Health. "CIOs are socially inept, highly intellectual people who tend to sit at the back of the room, while a CEO will work the room. I spend 90 percent of my time outside my office, and I expect the same of my direct reports. If business leaders don't see our faces, we are viewed as overhead."

2 **TALK THE TALK.** Speak the language of the business so that users and colleagues view you as a partner and not just another computer geek. "Physicians think in terms of patient safety, not ROI," says Hummel. "My senior managers and I do rounds with doctors and talk in terms of cost-per-discharge, not software systems. We hire people with medical experience who have a bent toward IT."

3 **APPLY FOR AWARDS.** "Unless you're in the software industry, it's tough to tell your business that IT is important," says Hummel. "We've been very proactive in finding awards inside and outside health care that validate our work and prove to the CEO that we're as good as we say we are. When we win an award for diversity or for one of the company's other pillars, it further aligns us with our company's vision."

4 **SEIZE THE DAY.** "The shelf life on opportunity is short," says Martin Gomberg, CTO of A&E Television Networks. "Competitiveness comes from getting out there early—as fast as you can—and taking the time to make it better, cheaper and more efficient. I'm not recommending you waste money on stupid projects, or even that you live on the bleeding edge. CIOs who get caught up in

TOP of MIND

THE COUNCIL HAS BEEN DISCUSSING...

Sarbanes-Oxley: Need to know how vendors are building compliance

Spam: As tedious a problem as ever

Sourcing Models: The right mix of insourcing and outsourcing is hard to find

Running IT as a Business: From chargeback to governance to culture

Digital Asset Management: Hot, hot, hot for media companies

OFF THE RADAR SCREEN...

Open Source: Still waiting for documentation, audit trails and better tools

Editor's Note: The CIO Executive Council is a professional organization for CIOs. Its mission is to leverage the strengths of a large coalition of CIOs for the purpose of achieving change within our organizations and shaping the framework for the future of IT. For more information about the Council, contact Martha Heller at **mheller@cio.com**.

asking themselves, Am I doing this in the best possible way and at the lowest cost? may miss out on chances to bring early value to the business."

5 **TALK ABOUT PROBLEM SOLVING, NOT TECHNOLOGY.** "Senior management needs to believe that you have the best interests of the business at heart and are not chasing fads," says Gomberg. "If we focus on solving the problems of the business, we get a lot more attention. Technology is just parts. Senior management wants to know what we're going to do, not what we're going to do it with."

6 **ANTICIPATE NEEDS BEFORE THE BUSINESS DOES.** "When I say I'm going to solve a business problem but it will take six months, business leaders have no way to independently assess whether that's too long," says Kathleen Starkoff, CTO of Limited Brands. "They want it now, and they're frustrated with how long it will take to enable. If CIOs can be proactive and anticipate technology needs before the business does, they will greatly reduce that frustration." One example she gives of a way to do that is to focus on enterprise functionality, rather than handling problems in a one-off way.

7 **ESTABLISH A SOLID BASE.** "You need a framework that relates IT to your company's business drivers," says Steve Brown, CIO of the Carlson Companies. "When you're talking to CFOs who don't know a damn thing about IT and don't care, it's great to be able to tell them, This is where this technology investment fits into your P&L. Then, they begin to get it."

8 **BE A POLITICIAN.** "You need to approach your job as though you're running for office," says Barbra Cooper, CIO at Toyota Motor Sales USA. "Your executives are constituents with different points of view who need to connect with you personally and believe that you care about their needs." To do this, Cooper has a systematic way of learning the line of business's value. "We use an outside firm to interview our business executives every 18 months to learn their perception of the impact of IT on their business," she says. "We customize our campaign based, in part, on what we learn from these interviews."

9 **CELEBRATE I.T.** "The University of Toyota Center for IT coordinates technology events—for example, a lecture about the Internet by one of its founders, Vint Cerf—that are open to everyone throughout the company," says Cooper. "We use the center as a forum to present large IT initiatives. We also have ribbon-cutting ceremonies for our major launches. We tie a giant ribbon around the computer, invite people from IT and the business (who worked together on the project), formally hand over the documentation, and have the business sponsor photographed while he or she cuts the ribbon."

PEER **COUNSEL**

» Running successful mentoring programs

Q: Can someone tell me how to set up a mentoring program?

A: Most important is chemistry. Meet over lunch to see if there is a bond. If there isn't, move on. Successful mentoring needs a clear start and finish with a finite list of goals and objectives. I recommend a nine- to 18-month window.

Don't mentor someone with whom you have a close professional reporting relationship. I might mentor someone three down in my own organization, but not one or two. You don't want a situation where someone is seen as getting an unfair advantage.

The decision of confidentiality has to lie with the mentee. If a mentee believes I can help resolve an issue with a boss or colleague, I will be happy to try, but only upon request, and only in circumstances in which the mentee has tried but has not succeeded.

A mentee can provide a different perspective on your department or corporation. You're missing an opportunity to learn if you see yourself solely as a teacher.

–HANK ZUPNICK, CIO, GE REAL ESTATE

Your data runs a six minute mile.

Michael Schrage | Making IT Work

It's All About the Execution

ILLUSTRATION BY SELÇUK DEMIREL

Naked Goes the Enterprise

The pressure for greater enterprise transparency is coming from all directions. CIOs can't resist the concept; they can only manage the execution. And they'd better do it well.

YOUR BIGGEST CUSTOMER comes to you demanding intimacy. He believes (and not just because his pricey consultants told him so) that real-time access to your company's intranets and databases will assure a more productive business partnership. *His* business will operate with greater efficiency if it knows what's going on in *your* business. Right now.

He doesn't make threats. However, if your company can't or won't see its way to greater network openness, well, his company will eventually cease to be your biggest customer. What's the matter; don't you trust him? Your CEO looks first to you and then to your chief counsel and says, "Make it so."

Turnabout is fair play. Your CFO tells you to approach your company's two most important vendors. Both sales and manufacturing have told him that they'd do a better job of hitting their numbers if these key suppliers could just get their prices down. Fortunately, your organization ranks high with them as a profitable and loyal customer. And by the way, these suppliers also need to do redesign turnarounds faster and be more responsive to just-in-time logistics requests. You are their means to that end.

If you can connect your company's design software and supply chain management software to their channel management, CAD and CAE systems, your executive leadership is confident that their prices will drop and their responsiveness will climb. You want your bonus, right? Then you'd better act when the CEO utters those three magic words: "Make it so."

We're not done. An FBI agent, an ambitious federal prosecutor and a furtive-looking fellow who says he hails from Langley, Va., come to your organization with a proposition. They believe (some lawyers might say they have "probable cause") that several international clients of yours are behaving suspiciously in countries that are not friendly to the United States. In fact, the G-men have been reliably informed that your products and services are an integral part of some potentially felonious behavior. And many of their suspicious characters rely heavily upon your website to keep updated and upgraded.

CIOs will have to be in on the negotiations for network access and implementation protocols. And they will be the ones held accountable if the costs of invasive transparency outweigh its benefits.

Court order in hand, the feds want you to use your customer service website to deliver spyware to these clients surreptitiously. It will be capable of tracking their keystrokes and probing their hard drives. Not to worry. You won't have to collect the information the spyware generates. It will be transmitted directly to government computers. You just have to deliver it—and its occasional upgrades—to your trusting customers. But if you tell anyone about this (including your board of directors), you and your colleagues will be opening yourselves up to charges of contempt of court or obstruction of justice.

Your CEO, tiny beads of sweat glistening on his upper lip, looks at the chief counsel, looks at you, looks at the feds one more time and says....

Undressing for the Future

Trust me, these vignettes have less to do with speculation than they do with inevitability. What responsible adults call *transparency*, and less couth managers might describe as *bare-naked exposure in compromising positions*, will soon become a distinction without a difference. This view of the future ain't pretty, but CIOs had better manage it...or else.

The natural extension of supply chain management, customer relationship management, and compliance with Sarbox and the USA Patriot Act is that enterprise IT infrastructures are invaded and penetrated by external networks, databases and software. This is what tomorrow looks like. Transparency implementation—whether internal or outsourced—becomes something that must be deployed in collaboration with key customers, suppliers and (ahem) other constituencies. There is no alternative.

The CIO's role, with colleagues in general and lawyers in particular, will be to negotiate both internal network access and its implementation protocols. In other words, CIOs will have to be in the room when these deals are cut. They'll have to be in the room when the nasty and niggling details of implementation are hashed out. This won't be fun.

The only thing more difficult to craft than access policies will be access implementations. Doubt that? Look at the ongoing litigation (Eliot Spitzer's suits are just one example) in both the criminal and civil court systems regarding search warrants and discovery. Admittedly, those proceedings are inherently adversarial. Then again, if you think negotiating access with your rivals is painful, negotiating access to—and with—your cus-

Share Your Opinion

Michael Schrage says the natural extension of **CRM and compliance** with new federal regulations is the invasion of your enterprise systems by external networks. And guess who's going to be the one held accountable for any trouble. How will you cover your transparency? Go to this column online to **ADD A COMMENT** at the end of the piece.

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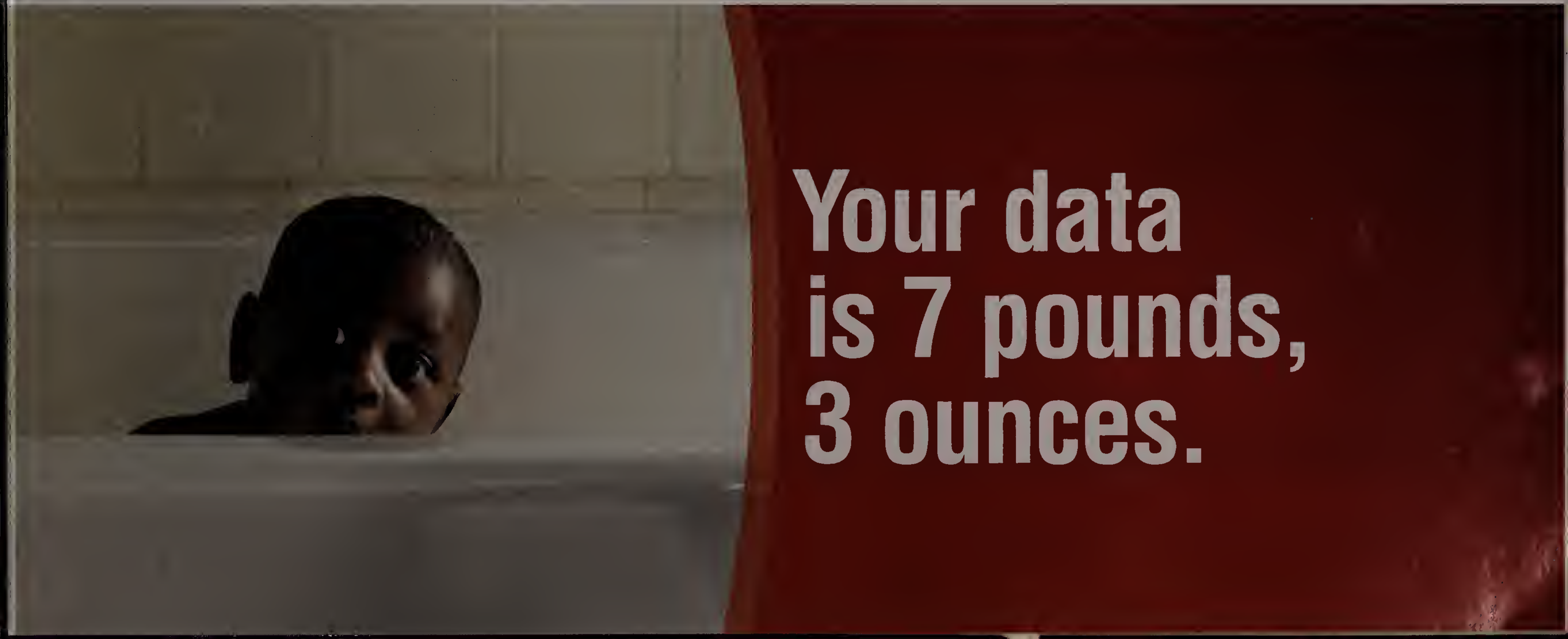

WHAT DOES IT Take TO BE THE Best

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While the lawyers, the board and the CEO will have the ultimate say as to what constitutes proper policies, the trend toward greater transparency can't help but make the CIO a more intimate part of the executive team.

tomers, colleagues and partners is even worse.

Why? Because CIOs will be the ones held accountable if the costs of invasive transparency outweigh its benefits. The lawyers always find a way to wriggle. Hammering out service-level agreements for transparency is guaranteed to become far more difficult—and far more important—than hammering out SLAs for outsourcing to Bangalore. To be sure, CIOs can't—and shouldn't—negotiate them on their own. But managing the SLAs for transparency portfolios will increasingly consume greater portions of CIO time.

When a Wal-Mart, GE, GM or, let's say, your bank decides that it wants enhanced access to your purchasing, inventory control and cash management systems...*or else*, it's not immediately clear whether this makes the CIO more influential within the enterprise or a C-level eunuch.

My own belief is that extreme transparency turns CIOs into very influential eunuchs. "We had no choice," says one CIO for a supplier who had to open the corporate kimono wide for his company's biggest customer. "We felt like we were going to be violated. But it was interesting. Most everybody was willing to share the data. What we were really afraid of was sharing network access. They could see what we were doing *as* we were doing it. That freaked the line managers out."

So what happened? It's still too early to tell. But one interesting side effect, says the CIO, is that "people don't write long e-mails anymore, and they're more matter-of-fact. I've found a couple of managers who now use their AOL accounts to send messages they don't want the customer to see."

The notion that greater transparency may prompt informal horse-trading (what economists like to call gray markets) in information exchange shouldn't surprise anyone. But guess who will become responsible for monitoring them? That's right: the overextended, naked CIO.

While the lawyers, the board and the CEO will have ultimate say as to what constitutes proper transparency policies, this nonoutsourceable trend can't help but make the CIO a more intimate part of the executive team. That said, CIOs had better be prepared to help their organizations honor the Golden Rule of Transparency: "Network unto others as you would have others network unto you."

Amen. CIO

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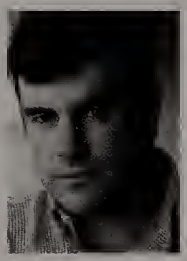

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Field-Tested Ideas from CIOs for CIOs

From Tech Smart to Business Wise

How the CIO of Scotts turned his IT staff into business advisers

BY SUMANTRA SENGUPTA

JUST FIVE YEARS AGO, the ability to nurture the information assets of the company we worked for was considered the main metric of success for CIOs. Today, we need to excel in business areas and functions such as supply chain management, customer relationship management and shared services. Understanding and deploying technology is table stakes.

How can CIOs deal with this radical change? How do technologists become business advisers? And even more important, how do we prepare the next generation of leaders?

At Scotts, the world's leading lawn and garden products company, I recently faced the challenge of retooling a large part of the IS staff. Given the fact that our business revolves around such large retailers as Home Depot, Wal-Mart and Lowe's, we decided to change our business strategy from being centered on our brands to being focused on our customers. In 2001, we launched a three-year project to redesign our supply chain processes and technologies to accommodate this new strategy. In so doing, we discovered we needed people who had two primary competencies: skills in planning, distribution and purchasing, and project management. And we wanted our project managers to be people who had delivered global systems such as ERP and Advanced Planning systems. We wanted about 50 percent of our workers dedicated to functional expertise in supply chain management, including customer service, and the other half managing the technology that would be needed to support the new business model.

ILLUSTRATION BY ROBERT NEUBECKER

Needed: Multiple Skills

We also found we needed people who excelled in financial controls, customer order management, business intelligence and new product development. Our preference was to hire people with skills in multiple areas and with prior experience in the consumer packaged goods environment. However, we also were willing to recruit a small percentage of extremely bright individuals who demonstrated the ability to learn and contribute rapidly in various functions.

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To achieve the right mix of employees, we evaluated people in two main areas: business maturity and technical competency. The ones who scored high on business maturity and low on technical competency are better suited to be part of the business rather than IS. These associates often develop a good sense for the applications of technology to the business areas, but are not suited to a future in the information services group. We often suggest that these people rotate through various areas of the business, with rotations being anywhere between 12 to 24 months.

Finding Your Top Performers

In fact, over the last two years we have placed about 10 percent of IS associates in key business functions and roles. And we have moved about the same number from the business into IS on a rotational basis. Similarly, the associates who score really high on technical competency but display gaps in business maturity need to be mentored in areas—such as sales planning or supply chain planning—that are important for their long-term success within the company. The top performers are those associates who score high along both dimensions. These people are often the ones who end up with multiple career options either within IS or as leaders in the business.

To be effective advisers to the business, IS associates should be able to perform at the same level of functional competency as the business side in areas such as production planning and order management.

After determining our new staffing needs and evaluating existing staff, we discovered that IS would require an influx of 30 percent new talent as well as a departure of existing associates who did not possess the right skills. The transition was handled in several phases, with some employees finding other positions within the company. Others (about 25 percent) were let go as we shifted to rely more on outsourcing applications management and infrastructure management across the globe.

Once that was accomplished, I had to retrain the remaining employees to be advisers to the business. I have found that organizations such as American Production and Inventory Control Society (APICS) and Institute for Supply Management (ISM) offer excellent professional training for IS associates. Similarly, I turned to customized training from The Ohio State University to provide financial analysis training for nonfinancial managers. We also have associates who are either certified or getting certified as project management professionals. At Scotts, we set aside training dollars for associates.

To be effective advisers to the business, IS associates should be able to perform at the same level of functional competency as the business side in areas such as production planning and order management. This allows the business manager to view IS as a partner as opposed to an alien technologist. In fact, most of the IS directors on my staff are expected to supervise at least one business improvement project that involves no new technology but is focused primarily on process redesign. In this way, the business stops regarding them as pure technologists with a hammer forever looking for a nail.

Mentoring is another mechanism that I have found useful. In this program, mentors from the business are paired with IS associates. For instance, our finance person is paired with someone from the corporate controllers office; a supply chain person is paired with someone from sales or supply chain.

The Education Gap

Despite such efforts, I can't help but wonder: Are we too late in creating this new breed of IS leaders? What is the role of the universities in developing the next generation at a time when the entire industry is under the cloud of offshore outsourcing? (For more on this, read "Degrees of Change" on Page 54.)

As CIOs, we can only do so much within our own organizations. We need to become actively involved in changing the academic curriculum at the university level to ensure that emerging groups of graduates are well-rounded in all areas of business as well as technology. I am still amazed by the fact that in many universities, the computer science departments and the business schools are not creating the kind of joint degree programs that will allow their graduates to develop successful careers in these turbulent times. CIOs should do what they can to shape the business school curriculum as well as teach courses. I teach courses in the Fisher College of Business at The Ohio State University and act as a mentor for graduating seniors in the MIS program there.

Undoubtedly, we are facing an uphill battle in an age when there is continued emphasis on outsourcing. But this is a battle that can and must be won to maintain our country's edge in innovation and productivity. We all need to take an active role in shaping the future.

Sumantra Sengupta has global responsibility for business transformations and information services for Scotts. He was previously a partner at consulting firm Capgemini. He can be reached at *sumantra.sengupta@scotts.com*.

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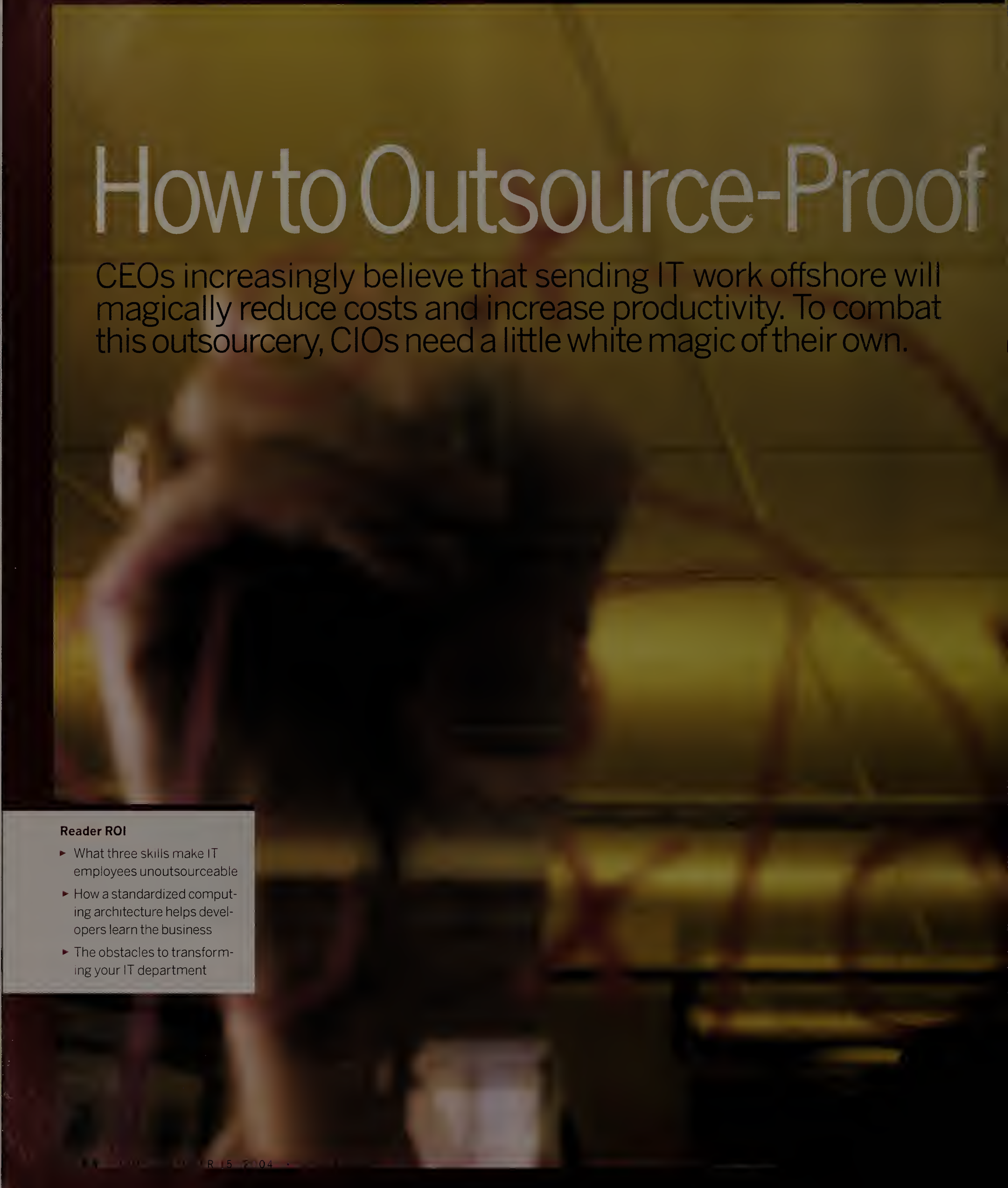

How to Outsource-Proof

CEOs increasingly believe that sending IT work offshore will magically reduce costs and increase productivity. To combat this outsourcery, CIOs need a little white magic of their own.

Reader ROI

- What three skills make IT employees unoutsourceable
- How a standardized computing architecture helps developers learn the business
- The obstacles to transforming your IT department

Your IT Department

A NEW GAME PLAN

BY CHRISTOPHER KOCH

PHOTO BY SCOTT INDEMAUR

Kevin Sparks is being chased by ghosts. They're the ghosts of outsourcing past, and they're telling him to change his 200-person IT department at Blue Cross Blue Shield (BCBS) of Kansas City before his past becomes his future.

Sparks's history includes a stint at Yellow Freight where, he says, a large outsourcing deal with Arthur Andersen fell apart. Much of the outsourced IT had to be brought back in-house, causing an upheaval in his staff and operations. He also worked at a small managed health-care provider. Because he was short-staffed there, he used offshore developers to help fill in some of the holes in a packaged application he was installing to meet the Y2K deadline and to retire the company's legacy system. The code the outsourcers produced, Sparks says, was fine, but the coordination and communication expenses erased much of the savings derived from offshoring the work.

The common theme in these experiences was that the business thought that Sparks's IT group

Blue Cross Blue Shield of Kansas City CIO Kevin Sparks's game plan is to be competitive in every area that companies use to justify IT outsourcing: cost, efficiency, responsiveness, productivity and quality.

was neither flexible enough, nor cost-efficient enough nor productive enough to compete with the outsourcer—impressions that were often revealed to be wrong after the fact.

"There's always the perception among businesspeople that 'I'm paying too much and not getting enough return,'" Sparks says. Especially in large companies, "a lot of the decision to outsource has to do with the fact that they're not in touch with what's going on in IT." CIOs haven't helped, Sparks believes, because they've failed to provide clear-cut proof that they can compete with outsourcers. Sparks wants to make his group competitive in every area that the companies he's worked for have used to justify outsourcing: cost, efficiency, responsiveness, productivity and quality. Here's how he's doing it:

▶ He has consultants helping him prepare for a Capability Maturity Model Integration (CMMI) assessment of his IT processes—just as the Indian offshore outsourcing companies do. This will give the business a clear picture of the efficiency, productivity and quality of Sparks's department to compare with what outsourcers have to offer.

▶ He's started a project management office to coordinate all midsize and large development projects to improve on-time performance.

▶ He's created an architecture group to standardize systems and apps wherever possible to reduce costs and increase productivity.

▶ He's developed performance metrics. Sparks's budget is now "transparent," he says, so the auditors can see exactly where he's spending and how much his people cost. At Kansas City prices, that's not a bad idea.

Oddly enough, Sparks doesn't have to do all this. BCBS is a nonprofit, and doesn't face the competitive pressures of a public company. And with concerns about privacy and security running high in health care, healthcare companies assume a huge risk by sending anything out of house.

But Sparks is doing it anyway. Why? Getting better today means he'll be more competitive tomorrow, when economics and industry fluctuations begin to make a more compelling case for outsourcing.

And they will.

8 Tips for Outsource-Proofing Your IT Organization

The best defense is a good offense. Here's how to make your department more competitive.

1. **Focus on collaboration.** Coding to spec can be easily outsourced; collaborating with businesspeople to develop a new technology-enabled process cannot.
2. **Compete on process.** Consider being assessed on Capability Maturity Model Integration (CMMI), a model for standard, repeatable development and project management processes. After all, that's how outsourcers compete.
3. **Develop an enterprise architecture.** A standardized architecture doesn't just save money on hardware, it makes your developers more flexible and productive across different areas of the business.
4. **Sell service levels.** Sure, offshore programmers may cost 35 percent less, but can they guarantee the quality of service your business has become accustomed to? (If they can, start worrying now.)
5. **Re-educate your staff.** Give your developers training time and the opportunity to transform themselves into collaborators and designers.
6. **Create a new career path.** Promise and deliver more money and stature to developers who move into collaboration and project management.
7. **Augment, don't replace.** Use outsourcers to make your staff more flexible and to meet demand peaks and valleys.
8. **Get transparent.** If you can't show how much IT costs (people, projects, time spent), businesspeople will assume that you're more expensive than the outsourcer.

–C.K.

Reprogramming Programmers

There are areas of IT where internal groups have a distinct competitive advantage over outsourcers, and there are areas of IT that are destined to move to lower-cost providers. CIOs who invest where they have advantages today stand a better chance of retaining a healthy IT department tomorrow, one that provides strategic value to the business even after IT's traditional currency of value—software code—moves to lower-cost providers.

"[CIOs] need to understand where outsourcing makes sense, rather than be reactive and have it thrust upon them by undereducated business executives," says Stan Lepeak, vice president of Meta Group.

Coming to this understanding—and acting on it—will be painful, and it will require a break from what made people fall in love with IT in the first place: writing code. The new emphasis will be on doing all the things that come *before* coding: business process design, requirements analysis, and envisioning architectures of data, software applications and user screens that make businesses run more efficiently. This is as much art as science and will require collaboration every bit as much as coding requires solitude. Many programmers will not have the skills—the communication skills, the understanding of business processes—to make the transition. The other areas of emphasis—project management and vendor management—may not interest them. CIOs will need to make heavy investments in retraining to keep the people they have and to support those who are unable to make the transition (see "The Right Thing to Do," Page 50); if they don't, there will be much less reason to keep the IT department—and the CIO—around after coding and maintenance and support are gone.

What Will Move Offshore

A single point of clarity has emerged from the furor over offshore outsourcing: Certain types of knowledge work will migrate to areas with lower labor costs as inexorably as certain types of manufacturing moved overseas in the '70s and '80s. The economics are inarguable. With the Internet, cheap telecom, well-educated workforces that speak English and costs of living as little as one-tenth compared to those in the West, many countries are equipped to do knowledge work for much less money and, arguably, the same level of quality as the West. Over 104,000 IT jobs moved offshore between 2000 and 2003, according to the Information Technology Association of America, and nothing suggests that the trend is going to change or even slow.

But there are a few catches. The outsourcer's economic advantage is fragile and liable to fracture if the knowledge work being sent offshore doesn't have the same character as the manufacturing work that went before it—that is, clearly defined, repeatable jobs that do not require collaboration or transcontinental oversight, and are easily measured and verified for productivity and quality. "The majority of successful offshore work is still the airtight project that doesn't require collaboration," says Meta's Lepeak.

That excludes "follow the sun" collaborative application development (in which one group of programmers hands off code to an overseas group at the end of each working day), says Rick Davidson, senior vice president and Global CIO for Manpower, an employment services company. Davidson says that in his experience, "any time you require a great deal of collaboration, the mechanics become burdensome."

Similarly, programming that requires a high degree of creativity and speed is less vulnerable to outside competition. Vijay Manwani, CTO of Bladelogic, a maker of data center automation software, tried sending some of his most complex new application development work to an Indian provider but wound up bringing it all back. "When you're a startup trying to innovate, you don't have the benefits of scale or time," says Manwani. "We sent some development offshore in 2001, and the team failed to deliver the quality we needed. We learned that when you outsource product development, the outside people just don't have the same sense of ownership as your own people."

But when it comes to pure construction programming (no collaboration required), the outsourcers have the advantage—especially when it comes to legacy systems. "I have about 150 developers working offshore [700 onshore], and it's all for simple stuff or systems I plan to sunset," says John Golden, CIO for CNA, an insurance company.

This doesn't mean that offshored work must be rote, claims Ravi Aron, assistant professor of operations and information management at the Wharton School of the University of Pennsylvania. "It's possible to decouple highly complex work and move it,

"The icon in the industry is the genius programmer-hacker, someone who works in isolation and creates great code," says Network Services CIO Mike Hugos. "Those days are over."

PHOTO BY CHRIS LAKE

Read More on Alternatives

As IT's traditional currency of value—software code—moves to lower-cost providers, the new emphasis will be on doing all the things that come before coding: analysis, design and collaboration. For more ideas and resources to help you with options to outsourcing, check out the **GOING WITH ALTERNATIVES** box of Web links with the online version of this article.

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but you have to be able to specify it," he says. Nor is work that requires frequent changes immune to outsourcing, as long as the changes can be clearly specified. That's why companies have had good luck offshoring maintenance and support for well-documented legacy systems where higher-level performance—say, instant response time or deep business knowledge—is not required. "Work that changes frequently can be outsourced, as long as the changes are in the logic of the programming rather than in the users' heads," says Aron. "The closer the changes are to the businessperson and the less expressible they are, the harder it becomes to outsource."

> The new breed of IT developers will be "people who re-architect work to achieve greater proximity to customers. IT people who can do this cannot be outsourced."
>
> –Ravi Aron, assistant professor, Wharton School

What Will Stay Home

The future of the IT department lies in finding ways to improve work and to translate those improvements into technology. A vague idea floating around inside a businessperson's head—say, for adding value to claims processing—can become an automated workflow system expressed in a series of well-designed computer screens.

Mike Hugos, CIO at Network Services, a distributor of housekeeping supplies and printing paper, says, there are three specific skills that in-house IT business analysts should have:

▶ **Process mapping:** expressing work as a series of linked boxes on a diagram.

▶ **Data modeling:** creating a logical data model for these new processes and designing applications (or linking together existing applications) around them.

▶ **Design:** devising a sequence of simple, intuitive user interface screens that reflect the new processes and data, thereby improving the productivity of the people using them.

All these tasks need to be done with the cooperation of the businesspeople who will be using the new system—meaning the IT person will need to be good at communication, collaboration and project management.

This new breed of IT developers will be "people who re-architect work to achieve better proximity to customers," says Wharton's Aron. "You need IT people who can troubleshoot information-related inefficiencies and allow senior managers to substitute automated monitoring for direct control. IT people who can do this cannot be outsourced."

Even if this type of work could be outsourced (and many IT consultants will argue that it can), IT departments have competitive advantages over outsourcers on many fronts:

▶ **Cost:** an internal salaried employee is generally half as expensive (outsiders who do this kind of work must be local—for now).

▶ **Knowledge of the business:** consultants generally have broad industry knowledge but can rarely match your own people when it comes to knowing how things work internally.

▶ **Motivation:** the desire among consultants to go the extra mile is usually limited contractually and by the fact that, ultimately, you don't sign their paycheck.

But there's one problem with shifting programmers over to analysis, design and project management: It's not why they got into IT. "People get a degree in computer science because they love the tools," says Manpower's Davidson. From college onward, the emphasis and the fun for most IT employees has been the coding. "The icon in the industry is the genius programmer-hacker, someone who works in isolation and creates great code," says Hugos. "Those days are over.

"We need to get over our perception of technology as mystery and magic and learn how to apply IT in a pragmatic way to business problems."

Reprogramming the Business

For IT employees raised on the legend of heroic coding, drawing workflow boxes or managing projects may seem mundane. "I point out to my people that project management is the next step in their career," says Jamie Riis, CIO of Bayview Financial Trading Group. "I say you can be the best in technology X, but you'll only make so much money. If you want to make more, you have to get into management."

"In India you're expected to move from developer to project manager within a certain time or you're out," says Meta's Lepeak. "But there's a perception in the U.S. that it's better to specialize in a particular technology, do it well and not move up to middle management."

Even more problematic than the programmer's self-image is the fact that businesspeople accustomed to judging IT departments by programming output may question what value project managers and analysts provide. "The perception can become that IT people run the things that aren't that important," says Davidson. Riis agrees, adding that it's up to CIOs to educate businesspeople about the new kind of value IT can provide: "It's about helping them understand that you're not just a group of programmers writing code; you're an information service solving business problems."

Building this information service means breaking decades of habit and encouraging developers to broaden their horizons. Development at CNA, like at many insurance companies, traditionally has been highly specialized. Workers focused on a particular technology and then gravitated to an area of the business that needed it. There they'd stay, sometimes for their

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entire careers. When he became CIO in 2002, Golden tried to build a transfer program so that developers could learn different areas of the business and move between projects. But he found that years of specialization frustrated his plan. "Each area had its own set of development methodologies and tools," he recalls. "The lifecycle they followed in billing was completely different than the one in claims. When someone moved to a new area, they didn't just have to learn the new business, they had to relearn the technologies and the development lifecycle."

Golden realized that his developers couldn't become more versatile simply by moving around. The technology architecture at CNA prevented it and demoralized employees who tried it. Golden began to see that enterprise architecture is not simply about standardizing servers and applications to save money; it has productivity implications for developers too. So Golden is working on an enterprise architecture with standardized computing platforms, development tools and lifecycle management processes that will allow his developers to focus on learning the business, rather than new technologies and methodologies, when they hop from one business area to another. Thanks to the new standards, Golden says, 20 percent of his developers can now move between at least three different areas. When new developers are hired, they are assigned a buddy—typically a businessperson who has long specialized in the area—to bring them up to speed. Golden also has a formal project management training program in conjunction with outside consultants; his people take one week of training per year. CNA also provides up to $10,000 annually in college tuition reimbursement per employee—as long as the employee promises to stay with the company for a year and a half after the courses are completed.

To make your department unoutsourceable, this shift from programming to analysis and collaboration need not be formalized, or even long-term, says Nancy Markle, president of the Society for Information Management and a former CIO at Home Savings of America, Fannie Mae and Georgia Power. At all three of those companies, she assigned IT employees to temporary stints within differ-

The Right Thing to Do

You can't save every job from being outsourced, but business and government can mitigate the pain—if they wish to

IT MAY GO SLOWLY OR QUICKLY, but the globalization of the IT workforce is inevitable. Hundreds of thousands of U.S. IT workers have lost their jobs to workers in foreign countries since 2000. And studies have shown that workers who lose their jobs to globalization usually wind up finding jobs at lower salaries—an average of $14,000 lower in 2001, according to Robert Litan, senior fellow in economics studies at the Brookings Institute. These workers also have trouble maintaining their health insurance and retaining their retirement savings during the transition. So what can be done to help?

1 **Trade Adjustment Assistance** Developed in the 1960s, this federal program was designed to provide financial support and training to manufacturing workers who had lost their jobs to globalization. Service workers, like IT people, don't qualify. Efforts in Congress to extend the program to service workers have fallen flat.

2 **Wage Insurance** When workers who have lost their jobs to globalization find new jobs, those jobs tend to pay less. Some economists have suggested that the government reimburse workers for a percentage of that difference for a certain period, say two years. Backers believe this would encourage workers to get back into the workforce more quickly by allowing them to risk taking a pay cut in exchange for learning new skills. Critics balk at the cost: roughly $5 billion per year to cover 50 percent of the average wage gap per worker, says Litan.

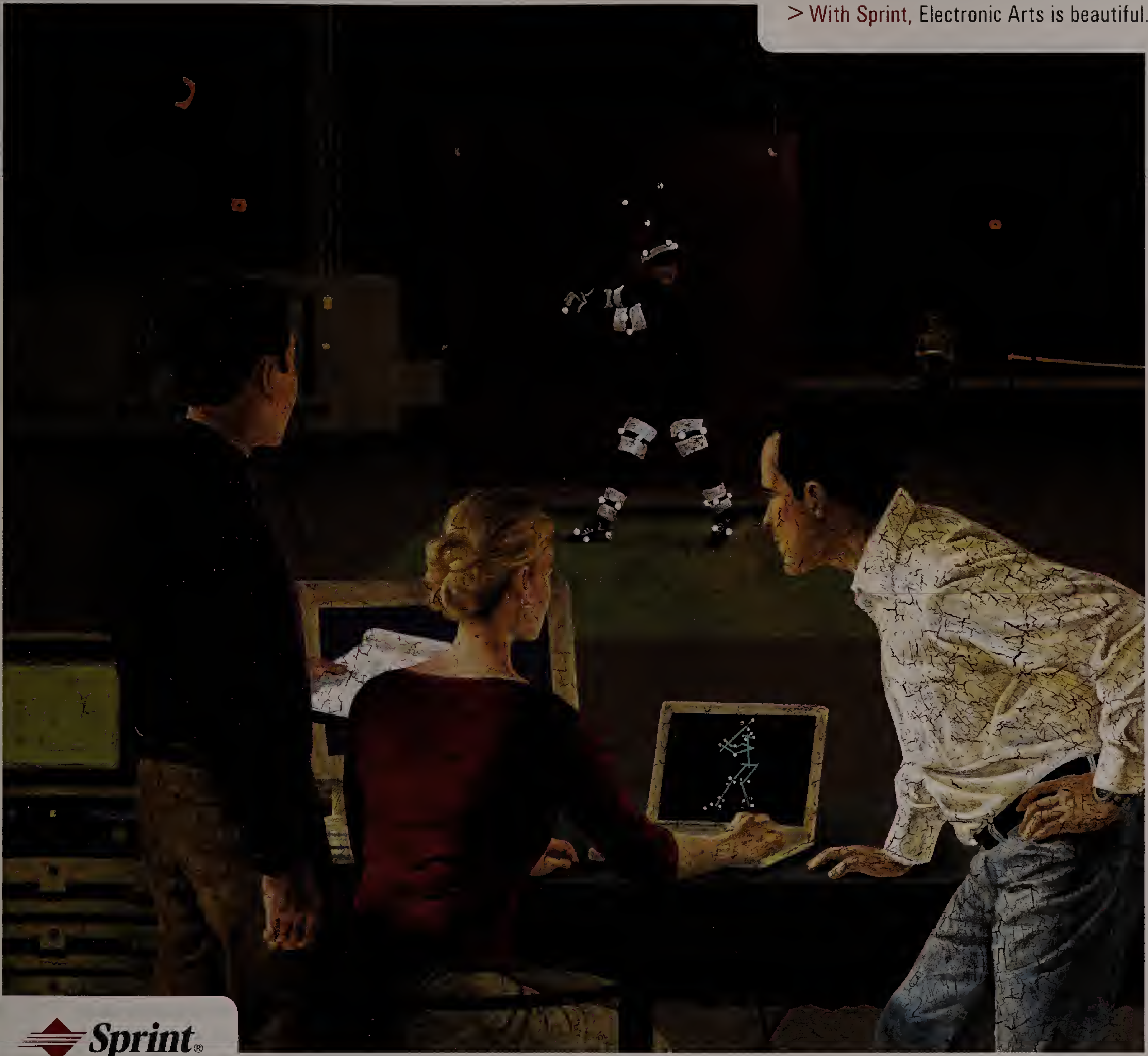
3 **Personal Re-employment Accounts** In 2003, President Bush proposed funding for states to provide up to $3,000 for each unemployed worker to use toward job training or essential services such as child care and transportation. Recipients could keep the balance of the account as a bonus if they found work within 13 weeks. Cost: $3.6 billion. Critics say the proposal, which at press time remains stalled in Congress, masks the need to improve the existing unemployment insurance system.

4 **Community Colleges** In his 2004 State of the Union address, President Bush proposed spending $250 million to fund partnerships between community colleges and employers in high-demand job sectors. Labor experts agree that community colleges are excellent for retraining workers because they tend to be more closely tied to local labor markets than four-year institutions. At press time, the proposal was in budget limbo. Critics say it's a drop in the bucket for a system that would have to be significantly restructured to address the needs of older workers.

5 **Tax credits for training** Various proposals call for giving tax credits to companies that invest in training. A bill proposed by Rep. Jerry Weller (R-Ill.) is specifically targeted at IT training and would give companies a 50 percent tax credit, up to $5,000 per worker. Weller has proposed IT training tax credits for years, but none yet have passed Congress.

6 **Benefits Portability** Those unemployed for more than 18 months can no longer buy discounted health insurance through their former employer. It also can be difficult for workers to transfer pensions and profit-sharing money between employers. There is no sign of Congress taking up either of these issues before the November election.

–C.K.



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ent business areas to learn the business processes and brainstorm improvements. "When the IT people came in and learned the process, they would say, I could write a quick program to automate that for you," she recalls. "They did quick and dirty things that the businesspeople hadn't even thought of. That helped the business streamline workflows—and made them appreciate the IT people. And the IT people made connections in different areas of the business that they could call on if they needed help."

With this emphasis on analysis, design and collaboration, outsourcing can help your IT department rather than simply replace it. With some of the programming work outsourced, IT can take on more projects, says Riis. "If your internal people have done the business knowledge work and put together detailed specifications, then you can outsource the construction. You're getting to leverage your employees' knowledge and increase their capacity." Golden adds that outsourcing gives him more flexibility for projects where resources may need to scale up or down quickly. "Having those 150 people offshore means I can flex the overall staff size more easily by varying the offshore component," he says.

What the Outsourcers Can Teach You

If IT is going to emphasize the higher-level work that has traditionally been the province of outside consultants, IT departments are going to have to start looking more like their consulting and outsourcing competitors. Primarily, this means creating a set of standard methodologies across the organization to increase productivity, improve delivery times and, potentially, improve quality. "Cost is usually the first criteria that businesses use when they consider outsourcing," says Lance Travis, vice president of research at AMR Research. "But then they tend to look at things they're not doing well."

This is why BCBS's Sparks began taking his organization through a CMMI assessment earlier this year. The CMMI model, which describes processes necessary for good software development, has five levels of sophistication, from one (chaos) to five (continuously improving). Sparks is planning to attain Level 3 by the end of 2006. As part of that effort, he's set up a central project management office.

If these process improvements pan out, Sparks believes it will make the inevitable comparisons between his group and the outsourcers more apples-to-apples. "When [an offshore provider] says we're CMM 5, that's impressive to businesspeople because they don't [normally] have any way to gauge the productivity and quality levels of their internal groups," says Sparks. "All they see is cost." CMMI allows businesspeople to make comparisons that go beyond cost. Once cost is de-emphasized, Sparks believes that most businesspeople will be willing to pay a premium for retaining direct, local control over IT.

But they'll only pay if they know exactly what that premium is. Clear performance metrics and absolute cost transparency can help—especially in areas considered prime candidates for outsourcing, such as help desk support. If the help desk is providing performance and quality that outsourcers can't match, cost becomes (nearly) a nonissue.

What Will Stay, What Will Go

Some knowledge work will be outsourced. That's inevitable. But other work will be outsourced only if you fail to compete.

Going

- Highly defined, noncollaborative programming
- Commodity help desk (Microsoft Office help desk, for example)
- Legacy maintenance (especially applications that soon will be retired)

Staying (at least for now)

- Highly collaborative, creative programming
- Project management
- Requirements analysis and design
- Business process consulting
- Processes demanding ultra-high service levels or localization
- Security risk processes

-C.K.

Preparing for the Inevitable

As CIOs improve service levels and performance, the cost gap between their people and the outsourcers will narrow. Indeed, the average salaries of offshore IT workers already are beginning to rise. (See "Outsourcing World Tour 2004," *www.cio.com/printlinks.*) "I don't know how long the labor arbitrage factor will be around," says AMR's Travis. "Salaries will be frozen here, and they'll go up in India as demand increases there."

But there's also every reason to believe that offshore providers will improve their collaborative capabilities. Some of the largest Indian companies are opening divisions in the United States and Europe to do project management locally. Conversely, outsourcing and consulting giants such as IBM and Accenture are building up their presence offshore to offer U.S. clients global coordination. And companies that can afford to build subsidiaries offshore (GE, for example, has long had centers in India) can bridge the coordination gaps themselves.

But Sparks isn't waiting to find out who will win the service and cost race. He wants to outrun the ghosts. "We know we're getting projects done faster," he says. "Our total number of closed projects is higher than last year."

So when (and if) he hits CMMI Level 3 in 2006, he expects to be surrounded by a fully staffed, highly valued, productive IT department, one with a viable future.

And then, he hopes, his ghosts will be gone for good.

Executive Editor Christopher Koch can be reached at *ckoch@cio.com.*

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CIOs say they need employees with business skills to build IT departments that can compete with outsourcers. Yet schools aren't providing this talent. Now, with enrollment in IT programs falling, colleges are beginning to listen.

BY TODD DATZ

Degrees *of* Change

Reader ROI

- How schools are trying to respond to IT's needs
- Why transforming college curriculums takes so long
- What CIOs can do to move the process along

Last year, Sumantra Sengupta, the CIO at Scotts, sat down with his network security group to find out what it was doing to protect his network from viruses. His staff boasted that it had installed great antivirus packages, five firewalls and a DMZ.

Expecting kudos from their boss, the group instead found itself being slowly raked over the coals of Sengupta's displeasure. Sengupta told the group that in his experience most viruses originate overseas, then work their way into North America. We have offices in 20 countries and 13 server farms around the globe, he said. So, assuming that an attack originates in Europe, help me understand how we're protected.

After more digging, Sengupta discovered that the company was indeed protected from viruses—but mainly in North America.

"They'd completely forgotten that we support 24/7, in all time zones," Sengupta says. It had escaped them that if a virus hit in Europe, the network administrators in the United States might be home in bed, not on the job responding to the attack. Sengupta says it took about a month's worth of work to ensure that the server farms were protected around the globe, around the clock.

The new IT worker will "need to work well in teams, work well with customers, have great communication skills and be problem solvers," says Maria Klawe, dean of Princeton's School of Engineering and Applied Science.

Sengupta tells this story to illustrate why he doesn't hire kids fresh out of school nor people who can't think through business problems. (Read about Sengupta's strategies for teaching his IT people business smarts in "From Tech Smart to Business Wise," Page 38.) His network security group failed to do that. "They got caught up in the technical elegance of what they were deploying," he says.

The moral of this story: Not having a pool of talent emerging from colleges with the skills CIOs need today is more than an annoyance; it's a threat to CIOs' ability to run IT effectively and efficiently.

The Decline of the Whizkid

In the 1980s and 1990s, technical elegance wasn't such a bad thing. CIOs welcomed legions of computer science grads into their shops, kids who were thrilled just to sit in their cubes and pump out line after line of dazzling code. Newspapers filled their pages with tales of pimply faced whizzes who spent their adolescence playing *Doom*, and then moved on to launch dotcoms or lend their genius to Fortune 500 companies. Today, say CIOs, the value of that kind of kid has dropped. In the new world order, hard-core programming talent—the kind readily available abroad—is no longer a meal ticket to a long, profitable future. "You'll be commoditized," Sengupta says bluntly. (For a glimpse of what the IT department of the future may look like, see "How to Outsource-Proof Your IT Department," Page 44.)

Parents and children are getting the message. According to the Computing Research Association's (CRA) most recent Taulbee survey (which provides enrollment and other data on undergraduate computer science and computer engineering programs), enrollment in those programs dropped 23 percent from 2002 to 2003. Why major in computer science when technology jobs are being sucked into an offshore vacuum of low-cost IT providers?

"We're much like English, economics or history; you can get an undergraduate degree in computer science and go on and do anything," says Jeannette Wing, head of Carnegie Mellon's School of Computer Science.

PHOTO BY STEVEN VOTE

Colleges are getting the message too. And they're listening to CIOs such as Sengupta complain that the computer science grads they're turning out lack the skills necessary to work with the business side. Consequently, some schools are beginning to rethink curriculums that traditionally have focused on training kids to be programmers. New IT schools have sprouted that offer business and other courses (art history with your Java, anyone?). And colleges are even trying to exorcise the stereotype of the narrowly focused computer geek. "Computer science is just as good a first major as any other. The analogy we'd like to make is that we're much like English, economics or history; you can get an undergraduate degree in computer science and go on and do anything," says Jeannette Wing, president's professor of computer science and head of Carnegie Mellon's School of Computer Science.

But institutions of higher learning aren't built for speed. Even with the best intentions, changing the character and content of the computer science curriculum will take time.

The Cost of the Skills Gap

James Dallas echoes many IT execs these days when he says he runs IT like a business. "It all revolves around having an impact on the bottom line and the competitive position of our company," says the Georgia-Pacific vice president and CIO. To do that, Dallas says he needs people with an understanding of key business drivers, business processes, project management skills, communication, presentation and innovation abilities. Tech skills are on the bottom of his list. "I find it easier to take someone with a business major and an appreciation of technology, then teach them IT, than take someone with tech skills and try to teach them business," he says.

Dallas would like schools to teach those business-oriented skills so IT workers can hit the ground running when (and if) he hires them. "Some of the basic programming skills are becoming a commodity," he says. "We don't want someone to come out of school to a market that doesn't place a lot of value on what they've received training in."

Of course, it's not all about doing right by the kids. At Merrill Lynch, Stephen Norman, COO of global technology and CTO of the infrastructure and data services group, would love to see schools teach business skills and offer courses on how to run big projects, because right now Merrill has to spend a lot of time and money teaching some of those skills itself.

Last year, Merrill launched a program called ML Markets, which taught its tech staff the basics of financial markets. "About 1,800 people went through it," Norman says. The company also offers a number of project management courses—the most intensive of which is a five-day, offsite course in which students stay together in a hotel and learn how to collaborate on a project plan. (The participants bring in real projects they're working on.)

All this, in Norman's view, is necessary; it's also expensive.

At Pfizer, the Business Technology Group doesn't even hire undergrads with technology degrees. "We hire MBAs almost exclusively," says Justin Sowers, director of global business technology. In fact, 95 percent of the 300 employees in the Business Technology Group have MBAs.

Sowers says Pfizer did experiment with hiring kids from Master in Information Science (MIS) programs, but most of those students didn't have the business chops to make the cut. "In information or computer science, you find very technically capable people. If you needed someone as a technical interface for data mining, you would find a great person.

"But you'd need another person interfacing between that person and the business to get results," he says.

The need for students with a solid grounding in technology isn't entirely going away. Plenty of people are still needed to develop and maintain complex systems. Michael Keselman, chief technology strategist at McKesson, says that while soft skills are a plus, he's still looking for tech skills.

So grads with computer science degrees should fit the bill, yes?

Well, not quite.

"What surprised me in computer science students was that they're not really prepared for real programming jobs in enterprises," Keselman says. Computer science curricula, in his view, focus overmuch on fundamental algorithms and specific programming languages, such as C++. That kind of learning may be OK for a software development company, but for large enterprises like McKesson, programmers are required to thoroughly possess knowledge of networks and databases. "Many computer science students don't even know what SQL is," he says.

Merrill's Norman would like to see those students get a better grounding in fundamentals: What is a microprocessor? What does an OS do? And he agrees with Keselman that the schools focus too much on object orientation and application programming languages. "When I used to recruit people personally, I would ask them how many bits there are in a byte; you'd be astonished how many computer science graduates can't answer," says Norman.

Transforming Computer Science

To address declining enrollment in computer science programs and change the image of the CS student, the deans have come up with a formula: CS + X

AT LAST JULY'S annual Computing Research Association (CRA) conference, deans of college computer science and engineering departments met to discuss what to do about declining enrollments and the rising demand from corporate IT for grads with soft skills. One of the most pressing items on their agenda was what to do about the perception that the tech world is populated largely by introverts, happy to hide behind their screens all day eating energy bars. The new IT worker, everyone agrees, is going to have to leap over the cube wall to work with a variety of people in a variety of ways. "They'll need to work well in teams, work well with customers, have great communication skills and be problem solvers," says Maria Klawe, dean of Princeton's School of Engineering and Applied Science.

The formula for teaching kids how to do that, some CRA attendees believe, is CS + X: taking computer science (CS) and combining it with other areas of study (X), such as business, psychology, biology or art. "The world needs people who can cross traditional disciplines," says Klawe. Indeed, Princeton now offers a first-year course in bioinformatics that integrates math, physics, biology and computer science. As part of the School of Engineering and Applied Science's strategic plan, the faculty is going to grow by 25 percent, and all of the new professors—some 32 people—will have cross-disciplinary abilities. (One recent hire has a CS and biology background.)

Jeannette Wing, president's professor of computer science and head of Carnegie Mellon's School of Computer Science, believes CS students will increasingly go into non-IT-specific professions. "If you think about science today—astronomy, chemistry, physics—it has mounds and mounds of data that [people in those fields] don't know how to process," she says. "That's where computers can come into play."

"Virtually every discipline and industry needs IT and computer science," says Klawe. "If you're talking to an anthropologist, there are opportunities for using IT [in that field]; same if you're talking to architects or physicists."

CS + X, in that it integrates computing with the needs of an increasingly technocentric world, is increasingly looking like the answer for computer science curricula. And it could change that geek image forever. *–T.D.*

The New, New Curricula

How is academia responding to the CIO lament that the kids they're interviewing from computer science programs lack communication skills and general business know-how? The answer varies from school to school. At the Department of Computer Science and Engineering at Ohio State, Chairman Stu Zweben says students learn communication skills by working in pairs in introductory CS; in later course work—such as system software design—students work in teams of three to five, and have both oral and written requirements to fulfill. But in terms of teaching business skills, Zweben admits his school has a distance to travel.

There are now some 40 or 50 undergraduate IT programs around the country, depending on whom you ask, and no two are exactly alike. Many are currently trying to take an interdisciplinary approach by grounding their computing courses in the context of business and society. According to William Aspray, a professor at Indiana University's four-year-old School of Informatics, the workplace increasingly is looking for grads from programs that "train their people in context—knowing, for example, a particular domain like the health industry."

At Indiana, Aspray (a former executive director of the CRA) says there are a number of ways that his school's approach differs from the traditional CS course of study. For instance, Indiana students are required to take classes on social informatics, the relationship between IT and people; organizational informatics, which looks at IT systems in organizations; and ethics and professionalization. Students at the school must also take five to six courses to complete a minor. (There are 25 possibilities to choose from; the most popular is business, says Aspray. Second most popular is CS. Others are in the social or physical sciences.)

New graduate programs in computing have popped up as well in recent years. The School of Management at Boston University offers a now three-year-old MS-MBA program in which students receive both an MBA and a Master of Science in Information Systems. "What we're trying to do is not think of IT as separate from marketing, finance, any function," says N. Venkatraman, management professor and chairman of the information systems department.

In the new world order, hard-core programming talent—the kind readily available abroad—is no longer a meal ticket to a long, profitable future. "You'll be commoditized," says Scotts CIO Sumantra Sengupta.

PHOTO BY STEPHEN WEBSTER

IT Jobs: Down, But Not Out

The Bureau of Labor Statistics' latest projection, released in February 2003, is that **IT will add 1.15 million jobs by 2012**, an annual growth rate of 3.1 percent, compared to a projected overall U.S. job growth rate of 1.4 percent over that same period.

Furthermore, **70 percent of all science and engineering jobs during that period will be in IT**.

According to Associate Dean of the full-time MBA program and Professor of Information Systems and Management Vijay Gurbaxani, University of California, Irvine's Graduate School of Management is creating a joint MS in computer science and business. "I don't think there will be a single MBA out there who will not be responsible for technology-influenced decisions," he explains.

Why All This Is Not Going to Happen Tomorrow

Of course, even with the best intentions, adapting curricula to meet the demands of a rapidly changing global economy will take plenty of time. Richard Baskerville, professor and chair of computer information systems at Georgia State University's Robinson College of Business, cites a favorite saying: "It's easier to

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change the course of history than to change a course in history." New courses and degree programs can take years to develop. It takes time to hire faculty, time to find funding, time to move the university bureaucracy. It takes time to do enough research to design and justify a course. That's why Carnegie Mellon's Wing says her department has yet to offer a course on software design, even though it's a course she'd like to see. "The research hasn't caught up," she says. In her view, there's no acceptable textbook on the topic, which means a professor would have to create one on his own.

John King, professor and dean of the School of Information at the University of Michigan, points out that business schools are actually *decreasing* their emphasis on IT, partly because there is a dearth of professors comfortable teaching the topic. "Very few business school faculty have undergraduate degrees in engineering, CS or the natural sciences. The majority have degrees in the social sciences or management. These people have never lived and worked in a culture of technology production. They don't understand [that world]," he laments. He adds that it's hard to find a strong IS program even in the elite business schools. That can't be too comforting to IT execs who are increasingly looking for graduates who can talk the technical talk and walk the business walk—all without breaking stride.

But it's not the mission of most universities to train workers; it's their job to educate students. Aspray says, "In the United States, there's still the sense that we're here not to train, but to educate, to provide foundational knowledge. I'm not too upset with the fact that maybe we're not always up to speed on the latest skill."

Job training is the work of community colleges and trade schools. A university has to deliberate carefully before responding to whatever's hot at the moment (Java? .Net? Web services?) because by the time it integrates a topic into the curriculum, describes the course, and budgets the money to recruit and hire a professor to teach it, the subject may already be yesterday's news. And then the school is stuck. What's to say that two years from now CIOs won't be complaining that new grads need to stop fiddling around in business courses because what they really need is people who know C++. (It's unlikely, but who knows?)

School Spirit

Five things CIOs can do to influence college curricula—and help themselves

1 **Join an industry advisory council.** Many computing departments have one; they're typically made up of alumni, CIOs, CEOs of tech companies and even an academic or two, and they meet once or twice a year. Joe DeTullio, CIO of Universal Music, serves on one at American University's Kogod School of Business (dubbed the Information Technology Executive Council). It advises the school on its undergraduate and master's level curricula. DeTullio says the group had a lot of influence in curriculum design.

2 **Participate in an industrial affiliates program.** "Most leading computer science departments have one," says Maria Klawe, dean of Princeton's School of Engineering and Applied Science. For between $5,000 to $25,000 a year, companies usually receive a one-day program through which they can get early access to student research. Klawe adds that executives also get the opportunity to lobby students and faculty about the kinds of research they're interested in.

3 **Host a co-op or an intern.** Not only do you get cheap labor, you create partnerships with local schools and often get first dibs at hiring the interns after they graduate. It's also another vehicle for you to offer input into a school's curriculum.

4 **Talk to classes.** Professors often invite businesspeople to speak to students. Why not practice a little public speaking, and at the same time tell teachers and students what kinds of skills you recommend graduates get? And you can leave your business card.

5 **Get involved in your local professional IT groups.** They provide great opportunities for meeting local faculty. *–T.D.*

Making It Real

To see how one business school is trying to keep up with the new realities of global business, read **CHANGING NEEDS, CHANGING CURRICULA.** Find it in the online version of this article or in **www.cio.com/printlinks.**

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King sums up the inherent tension between the conservatism of higher education and the ever-shifting demands of business and society: "We don't *want* the academy to change as quickly as society. We buffer society from mechanisms that would allow one or a small number of individuals to destroy something of long-term value." But, he adds, "That doesn't mean we can't speed things up a bit."

IT leaders can take comfort in the knowledge that what they're saying—We want students with communication, analytical and project management skills! Problem solvers! Team players!—is being heard loudly and clearly up in the ivory towers. Academics are also thinking creatively about how to stem the tide of declining enrollments. After all, there's some 15-year-old kid out there right now, reading the stock tables, listening to MP3s and trading IMs with her friends—and she just might have a great head for business.

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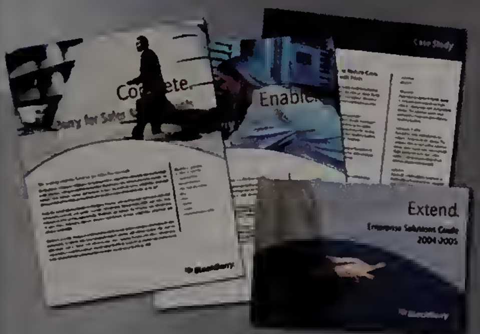

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LESS FOR SUCCESS

BY ALICE DRAGOON

Forget the big approach. When it comes to demonstrating the value of **knowledge management,** a **piecemeal** strategy works best.

When Danny Shaw signed on to become the first chief knowledge officer at Children's Hospital in Boston in 1998, his initial task was to build a data warehouse to unite information from multiple, disparate sources. The idea was to enable analysis of both the hospital's efficiency and the effectiveness of its care, as well as the key factors influencing each. But even as he started the project, Shaw says, he began thinking about the endless possibilities of applying "knowledge management with a capital K and M." He sketched out a grand KM strategy that would deliver KM tools and ultimately reshape the hospital's culture into one that would embrace KM. "I naively had this big vision of knowledge management as a huge umbrella encompassing all these initiatives. We were going to descend on this and make things wonderful for everybody," he recalls.

But when he tried to convince executives to invest in a half-million-dollar content management system to shore up the hospital's then-meager website, Shaw got a major reality check. "We don't treat patients over the Web," he was told. And there was no way he was getting the half mil. Shaw ended up building a scaled-down but perfectly functional content management system in house at a fraction of the cost. It was then that he realized championing an enterprisewide KM strategy was like "trying to eat the elephant all at once."

Shaw went back to the drawing board and came up with a new KM game plan. Instead of approaching it like an all-encompassing ERP project, he'd tackle KM the same way he was building the hospital's data warehouse: incrementally. He would start with a series of small, discrete KM initiatives that would quickly demonstrate value, then gradually build on those successes, creating a knowledge-enabled organization one layer at a time.

The dream of knowledge management, or getting the right information to the right people at the right time, is perhaps the ultimate goal of IT. But let's face it, managing knowledge effectively is damn hard to do. The more successful a company is at building a huge repository of knowledge, the harder it is for people to slosh through it all to find exactly what they need—let alone hit upon that gem they didn't know they needed. And while KM's long-term potential is boundless, the benefits are often subjective and thus tough to

PHOTOGRAPHY BY STEVEN VOTE

At Children's Hospital, there was resistance to Chief Knowledge Officer Danny Shaw's initial plan for a big KM project. He scaled it down and now he's glad.

tally on a spreadsheet. As a result, many companies that jumped headlong into the KM pond amidst a chorus of vendor hype quickly became disillusioned with the whole concept of KM.

"The vast majority of KM implementations for three years and back didn't work," says KM expert Donna Fluss of DMG Consulting. Companies failed at KM, she says, because they tried to tackle too much in one fell swoop. "If you try to change 100 things at once, you have a very large bag of things that can go wrong. If you try to change 10 things, you have a better chance," she says. "Big bang may have happened once, but it's not going to happen in your KM initiative." But the good news is that KM can be very effective if it's tied directly to discrete business needs and opportunities. By starting with targeted projects that quickly deliver value, CIOs can achieve through evolution the success that proved elusive with those large, big-bang approaches. Here's a look at how, by starting small, you can make KM pay off.

CIO George Gazdick of law firm Squire, Sanders & Dempsey has piloted a KM system that enables lawyers to get a jump on research.

START SMALL, THINK INCREMENTAL

Starting with a small KM initiative makes sense for a host of reasons. Smaller projects—or splitting a big project into phases—gives you more control over the outcome. And a small-scale failure won't doom your entire effort. "If you have a three-month phase and something goes wrong, you can fix it," says Fluss. "If you have a 12-month phase, by the time you realize something went wrong, you can have spent hundreds of thousands of dollars, if not millions. It's hard to recover from that."

Smaller projects also provide a safer environment for trying out new KM concepts and adapting them to fit your organization. "KM for your company will never be the same as the KM you hear about in other companies, so you need to do lots of iterations to learn as you go," says Sam Marshall, KM specialist at a global European-based consumer goods company that he won't identify. "You can't import someone else's KM success into your company and expect it to work the same way any more than I can tell you I had a fantastic holiday in Scotland and you book the same holiday and have the same experience."

As Shaw of Children's Hospital discovered, it's also a lot more feasible to get funding for a series of smaller projects than for an enterprisewide initiative, particularly if the benefits are difficult to quantify. "Even if I can go out and garner great interest, I typically can't go out and garner a great budget," he says.

Thinking incrementally helped Shaw deliver a highly useful data warehouse. Instead of taking two years to create the ultimate, all-inclusive data warehouse, Shaw started with a single data source and gradually added others. Through many iterations, he has built what he now considers a mature (although ever-evolving) entity that has enabled administrative and clinical operational analyses.

ENGINEER FOR VALUE

By starting with a small, focused KM project, it's simpler to clearly define the value you want to achieve and establish at the outset the metrics that will prove success. Former Ericsson Canada CKO Anders Hemre, now founder and CEO of InterKnowledge Technologies, calls such a process "engineering for value." "It's easier to demonstrate value because you know what you should be looking for," he explains. "If you have all the business logic defined up front, you may make a mistake, but you will see [that mistake] as you go forth. You'll be in a much better position to manage it than if you just plunged in."

Instead of attempting to demonstrate enterprisewide value for a KM project, look for value at the individual level. Value might be created in a specific process area, or even just for certain kinds of transactions. "You've got to put it in the context of your organization and bring it to the level of the individual, and then value engineering really works," says Hemre. For example, at law firm Squire, Sanders & Dempsey, CIO George Gazdick has just piloted a system that lets lawyers use Lexis, the online legal information database, to search for internal documents and track down colleagues who may have expertise relevant to a new case. Harris Senturia, the partner sponsoring the project, sees the value as giving lawyers a head start in the research process so that they can devote more time to thinking about their clients' problems. Senturia doesn't quantify the value of having lawyers spend less time researching and more time thinking, yet he knows that's something that his fellow partners understand on a personal level.

The more focused the project, the simpler it is to establish workable metrics. For example, at the Texas Department of Public Safety, the main goal of a project to modernize the state's crash records information system is to reduce the backlog of data entry from two and a half years to three months or less. (See "KM by Any Other Name," this page.) Project Manager Cathy Cioffi will also measure how long it takes to process individual crash reports. She's not, however, attempting to project potential taxpayer savings since it's difficult to put a dollar value on what the current processing backlog is costing the state.

"BAKING IN" THE KM

A lot of early KM efforts failed because they added cumbersome steps to the jobs of already overworked employees. So when things got busy, workers just didn't bother with the extra steps. By starting small and focusing on one job role at a time, you can build KM into a job function in a way that actually helps employees do their jobs better, faster or more easily. KM veteran Tom Davenport, professor and director of research at the School of Executive Education at Babson College, calls this "baked-in" KM.

"You need to embed knowledge into the structure of the job that knowledge workers already pursue so it can't be avoided," Davenport explains. Doing so makes it much easier to measure the impact and justify it economically, he says.

One way to ensure initial support for KM concepts is to start by embedding knowledge into your organization's most important knowledge-oriented role, then expand to the next most important role and so on. Partners HealthCare, for instance, first built the infrastructure for workflow automation, then initiated a series of projects focused on specific clinical domains. The first such project embedded drug-related knowledge into the electronic system for ordering and dispensing medications, alerting doctors if a drug they were about to prescribe might adversely react with another drug the patient was already taking. The system reduced adverse drug events by a stunning 55 percent. By helping doctors practice safer medicine, the project generated support for further embedding of knowledge into the processes of ordering tests, then managing referrals, and most recently, baking into the order-entry system the most effective clinical protocols for handling specific cases.

At 3i Group, board director Rod Perry, who is responsible for the European venture capital firm's global technology investments, launched a KM portal that helps employees in 15 countries quickly find out about their colleagues' previous contact with prospects for new deals. Perry started with a pilot in the technology investment division (that group was most open to using technology and needed to operate

KM BY ANY OTHER NAME

In all but the most enlightened organizations, labeling a project a KM initiative is asking for trouble. It invites philosophical discussions about the nature of knowledge and political debates over who owns it. There's also a good chance people won't understand what you're talking about. "KM is like CRM. It means a hundred different things to a hundred different people," says Novell CIO Debra Anderson, who avoids the term altogether. And any execs who've been involved in or know of a failed KM venture will likely gag at the very mention of KM.

When the Texas Department of Public Safety wanted $14.1 million to update its archaic crash records information system (CRIS), it didn't attempt to sell the state legislature on the concept of KM. But pitched as a reengineering effort that would eliminate a two-and-a-half-year backlog in processing crash data and allow the department to better assess safety and prioritize highway projects, the project got approved. "We could not have gotten funding at the state level for something classified as a KM project," says CRIS Project Manager Cathy Cioffi. "We had to show the business links—and where the value is—because we're using taxpayer dollars."

Business links and business value are safer ground than KM jargon because most executives would rather be an earning organization than a learning organization, as InterKnowledge Technologies founder and CEO Anders Hemre likes to say. Hemre advises identifying the problems in your organization that KM can solve, and then designing specific projects around those goals. Your organization might, for example, need help locating expertise, accelerating learning or retaining knowledge. Other goals that targeted KM projects can address include sharing best practices, increasing collaboration, effectively managing ideas, getting early warnings about new technologies and increasing return on creativity.

Don't get hung up on calling it KM. "Use a language the organization understands," says Hemre, "and address problems the organization can recognize." *–A.D.*

globally), amending business processes to force people to use the system. He decreed that all documents for investment meetings had to go through the new portal; e-mailing documents was no longer allowed. Although ROI is hard to quantify, success anecdotes are reinforcing adoption. Someone in the Madrid office who saw an opportunity to do a deal with a German chemical company was able to discover within minutes that a colleague in Milan had connections with the German company. Without the system, figuring that out probably would have taken two weeks. Once other employees began to see the benefits the technology group was reaping from the portal, they got interested, too; the buyout business for example, began using the portal for collaboration.

At Squire, Sanders & Dempsey, an early '90s attempt to create a repository of the firm's legal briefs failed because it required lawyers to access a system that they didn't normally use to locate a brief. Gazdick saw an opportunity to embed the firm's knowledge into the lawyers' regular activities through Lexis. Because the lawyers already use Lexis regularly to look up case histories, it's simple for them to use it to search for internal documents as well. "It tends to be easier to find things if they happen to be where you're looking," says Gazdick

> **"If you tie KM to operational measures like numbers of customers won or numbers of quality products produced, people never want to go back."**
>
> —TOM DAVENPORT, PROFESSOR AND DIRECTOR OF RESEARCH AT BABSON COLLEGE'S SCHOOL OF EXECUTIVE EDUCATION

Another tried-and-true way to build support for KM is to start small with a pilot among a select group of influencers—employees who are well-respected by their peers. At Novell, Technical Services Program Manager Kenny Bunnell handpicked 25 technical support engineers to take part in a blind study to test three search engines (Google, Kanisa and Primus). He cooked up an innocuous GUI so the engineers wouldn't know which of the three they were using as their day-to-day troubleshooting tool during the six-week pilot, which ended in February 2003. The Kanisa engine scored one-third higher than the next closest competitor, sealing the decision. "To this day, the 25 engineers involved in the initial pilot have gone on to be active advocates for the system," says Bunnell. "It's their baby."

It's that kind of end user buy-in that's essential for any KM project. "If KM is really baked into the work of knowledge workers, people will come to say 'we couldn't do without this,'" says Davenport. "At Partners, they got a 55 percent reduction in adverse drug events. What are they going to say, 'Let's get rid of this and let all these people die?' It's pretty compelling. If you tie KM to operational measures like numbers of customers won or numbers of quality products produced, people never want to go back."

UNDERPROMISE, THEN BUILD ON SUCCESS

ROI for KM initiatives—particularly large ones—is notoriously difficult to project. In fact, Hubert Saint-Onge, CEO of Konverge and Know, a KM consulting company, has said he believes that 50 percent of all ROIs are bogus. Rather than cook up a hard-dollar ROI that you may not be able to deliver on, it's far better to underpromise and overdeliver. And it's generally easier to justify a smaller project that way because there's less at stake.

If you're trying to get funding from executives who are known skeptics of KM, it's often wise to just promise that the system will pay for itself and therefore is worth trying out to see if incremental benefits can be gained. For example, Hemre says if you can show that a system will save just two hours for everyone who uses it over the entire lifetime of the system, it could pay for the investment. "That's not a huge statement," says Hemre. "But it shows the plausibility of it rather than producing actual numbers, ROIs." Such a low-key strategy can often make the decision to try a KM project feel like a no-brainer.

Once you've achieved even small successes with KM, it's important to celebrate them, to help build a base of credibility and support for future KM efforts. Because ROI can be so difficult to quantify, be prepared to leverage anecdotal KM success stories to help get new KM efforts off the ground. When Hemre was CKO at Ericsson, for example, a manager told him that a KM initiative spared him from having to hire as many as four to six new development engineers in the course of developing and providing market support for a new product. Anecdotes like that can help convince KM-wary executives that KM can yield concrete benefits, paving the way for more projects.

The slow and steady approach to KM at Children's Hospital has paid off, yielding multiple success stories on top of the mature data warehouse. A document management initiative, for instance, has improved the quality, control and accessibility of critical documents such as clinical practice guidelines, pharmacy guidelines and nursing care manuals. Today, Shaw sees the fact that Children's Hospital balked at spending $500 grand on a content management system as a blessing in disguise. "We were able to stay off the budget/expectations radar screens long enough to demonstrate success and value," he says. "The project garnered a great deal of credibility for our team."

And with a concept as amorphous as knowledge management, it's all about building credibility. "You're not going to get a second chance," says Hemre. "If it fails or doesn't deliver, you lose credibility. The organization won't listen a second time."

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> *Linux, Unix, and Windows TCO Comparison*

The Yankee Group, a global research and consulting firm, concluded that a significant switch to Linux from Windows or Unix could cost three to four times as much without delivering tangibly better performance or business value. These findings are based on a non-sponsored worldwide survey of 1,000 IT administrators and C-level executives in midsized and large enterprises.

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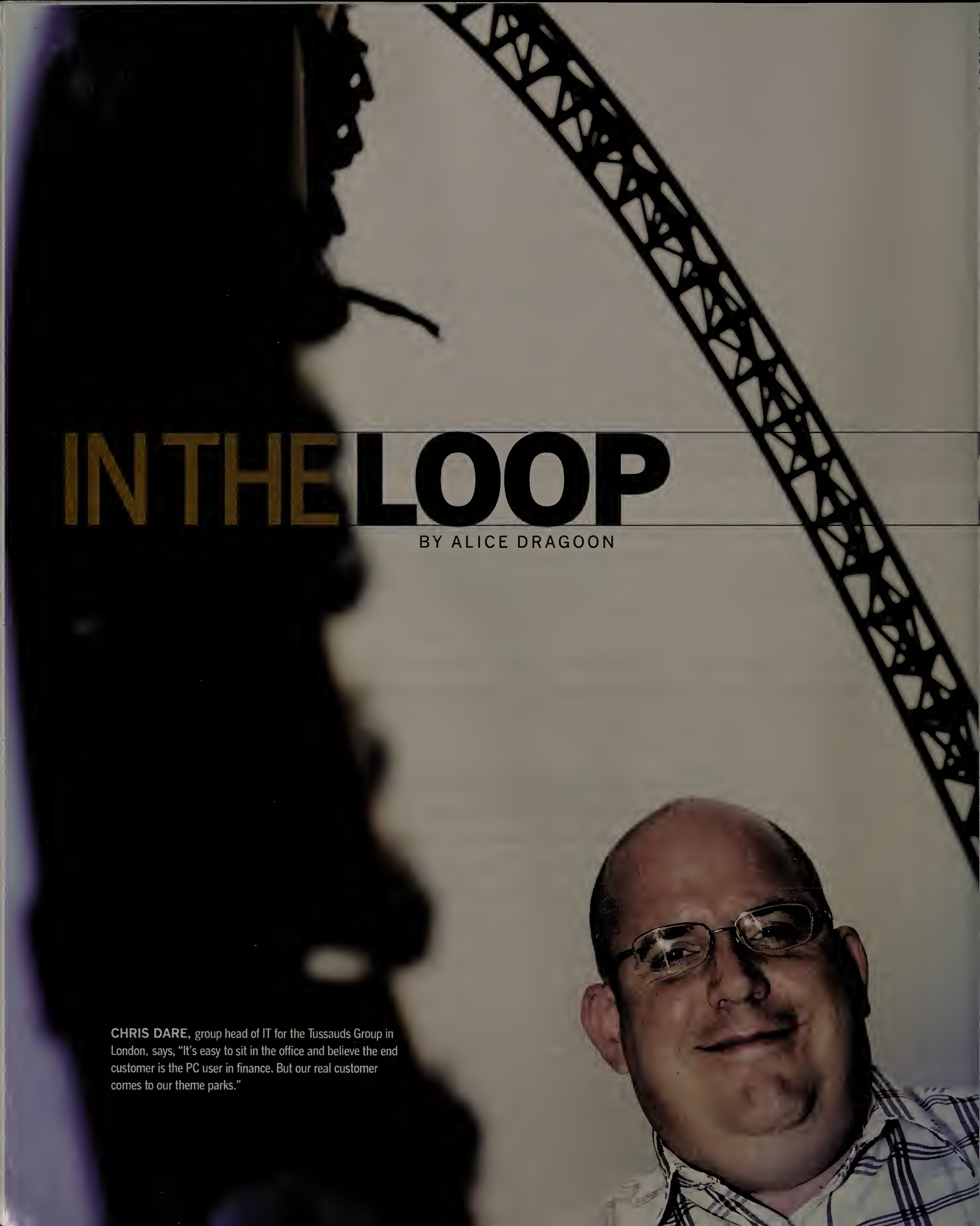
IN THE LOOP

BY ALICE DRAGOON



CHRIS DARE, group head of IT for the Tussauds Group in London, says, "It's easy to sit in the office and believe the end customer is the PC user in finance. But our real customer comes to our theme parks."

Meeting with customers on a regular basis gives CIOs fresh ideas on how to improve customer service and justify new systems

Reader ROI

- Why customer contact ought to be a regular part of your routine
- How customer outreach can help you improve systems for customer service and bring in new revenue
- Why customer interaction gives you sound justification for technology spending

THE SNEAKER SAILED OUT OF THE SKY, LIBERATED from the foot of a thrill-seeking customer. It landed somewhere in the bushes beneath the Nemesis Inferno roller coaster at Thorpe Park, an amusement park just outside of London. Braving the brambles to retrieve the missing shoe was just part of a day's work for Chris Dare. In fact, in Dare's five years at the Tussauds Group (which runs 11 attractions on three continents, including the famous Madame Tussauds wax museums), he has dished out ice cream, picked up litter, loaded people on rides and manned the turnstiles during the morning rush. He's also pushed the expansion of a Fastrack system that reduces customer wait times and revamped the corporate website to make it easier for customers to buy advance tickets. For despite an innate ability to find fallen footwear and scoop ice cream, Dare's official title at Tussauds is group head of IT.

Dare is one of the relatively few IT execs who make it a point to interact with customers, an activity at the bottom of the priority list for most CIOs, according to a recent *CIO* survey. Yet Dare and other IT executives who make the time have found that rubbing shoulders with external customers yields enormous benefits. By opening a direct line of communication with customers, CIOs often get ideas for how to apply technology to improve service or cut costs—epiphanies they'd never have if they had stayed cooped up at corporate headquarters. They are also more adept at justifying technology investments because they can personally attest to how such investments will make life better for customers. And IT executives win points with top management when they pick up on things beyond the realm of IT that spark smarter ways of doing business.

"It's very easy to sit in the office and believe the end customer is the PC user in finance down the corridor," says Dare. "But actually, our real end customers are the people who come to our theme parks

PHOTO BY STEVEN VOTE

and city center attractions." Whether they like it or not, CIOs are in the marketing business and they need to be out mixing it up with customers, asking about their problems and how IT can help solve them. As online services and service automation expand, marketing guru Regis McKenna predicts that the pressure on CIOs to understand what's going on with the external market will only increase.

"Unless you know how customers are using [IT systems and services], how they're applying them, you're not going to be able to design those systems," says McKenna, who is author of *Total Access: Giving Customers What They Want in an Anytime, Anywhere World.* "You have to know what customers want."

Toward that end, Dare carves out one day a month to work on the front lines at one of Tussauds Group's amusement parks or attractions, which also include Warwick Castle and the London Eye—a ride that looks like an overgrown Ferris wheel. John Hummel, senior vice president of IS and CIO of Sutter Health, a California-based nonprofit network of hospitals and doctors, spends more than a third of his time with patients and clinicians. He attends community meetings, talks with patients' groups and goes on rounds with doctors—even scrubbing up to observe procedures in the operating room. Other IT executives spend at least a day a month in their company's stores or on the road with service technicians.

Here's a look at what CIOs are discovering on the front lines—and how they apply what they learn when they get back to the office.

Five Easy Steps
FOR MAKING THE MOST OUT OF CUSTOMER CONTACT

1 **Build customer outreach into your schedule on a regular basis. If you don't schedule it, it's too easy to let it slide.**

2 **Tell your staff why you're venturing out to the front lines and encourage them to do the same at least twice a year.**

3 **Create mechanisms to apply what you learn from customers. Field reports with action steps, for example, can help you get the ball rolling.**

4 **Take your PDA or a notebook to record your observations or capture quotes from customers to help bolster your case for future IT investments. That way, you can routinely build feedback into business cases for major investments.**

5 **Share your findings with the CEO. The fact that you're doing original research boosts your credibility.**

–A.D.

THE IDEAS ARE OUT THERE

When Michael G. Relich was CIO of Wet Seal, a clothing chain catering to teenage girls, he used to hang out in stores to observe the customer experience—and earned a lot of suspicious looks from mothers shopping with their daughters. Telling them he was from headquarters helped diffuse the situation and gave customers an opportunity to offer an earful of opinions (mostly "Ohmigosh, the clothes are so cute!"). Relich was particularly interested in seeing how a new point of sale (POS) system he had installed in Wet Seal stores was working. "You always hear the horror stories, 'Well, the register went down or was so slow we had 20 customers queued up,'" Relich says. "A lot of times that was exaggeration."

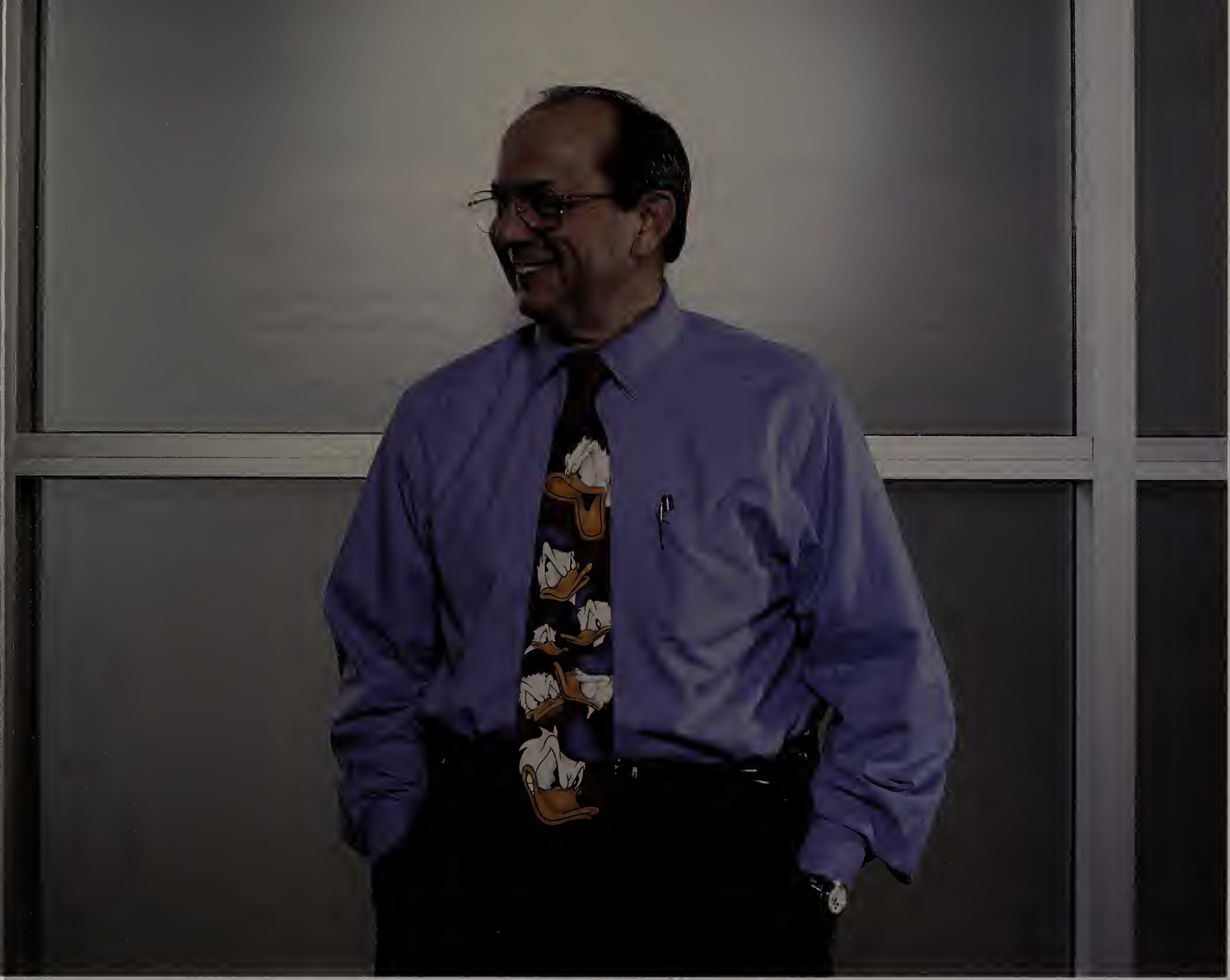
Although recent press reports suggest that Wet Seal is teetering on the edge of bankruptcy (the chain missed the trend among teens for cheap, disposable apparel), Relich did a masterful job of recognizing customer needs and applying IT to address those needs before he left the company to become CIO of Guess in May.

Relich, for instance, observed many Wet Seal customers asking if discounts were ringing up because they couldn't see the POS display monitors, which face the sales associate. These frequent Q&A sessions slowed lines. To remedy the situation, Relich worked with the POS vendor to show a running tally of the sale on the display panel of the credit and debit card authorization device.

Relich's store scouting expeditions—and the fact that he also ran e-commerce and thus read all customer e-mails—spawned other IT initiatives aimed at making customers happier. He noticed, for instance, that salespeople often didn't have the 10 minutes or so it took to call other stores to locate a desired item in another size or color. As a result, the stores lost sales and disappointed customers. That observation, combined with online customer feedback, gave him the idea to develop a store locator function on the employee portal, which employees can access through any POS terminal. In 10 seconds, salespeople can now check the portal to see which other stores have the item in stock.

During store visits, Relich also observed boxes of new merchandise stacked in the back rooms of stores because salespeople were too busy to unpack and display the contents. That prompted him to put a shipment status window on the employee portal. Now managers

When you **reach out to your customers**, be prepared to see some of your **long-held assumptions unravel.**



JOHN HUMMEL, CIO of Sutter Health, discovered that patients were more interested in going online to refill prescriptions and schedule doctor visits than to pay bills. So he concentrated on enabling online prescription refills and appointment scheduling through a patient portal.

PHOTO BY SHANNON MCINTYRE

use the window, which connects to Wet Seal's ERP system, to find out when to expect shipments so they can schedule enough labor to get the latest merchandise on the floor—and into customers' hands—more quickly. Getting into the stores allowed Relich to see for himself what customers were doing.

"It's much more effective than hearing it secondhand," he insists.

LEAVE YOUR ASSUMPTIONS AT THE OFFICE

In reaching out to your customers, be prepared to see some of your assumptions unravel. By getting out onto the front lines, Dare, for one, concluded that IT's practice of "dumbing down" technology—by installing simplistic touch screens, for instance—was unfounded. He also realized that Tussauds' city center attractions draw different kinds of customers than its theme parks, forcing him to rethink his strategy of providing both kinds of facilities with much the same technology. Dare observed that tourists in city center attractions spent a lot of time buying souvenirs. At the theme parks, however, people were less interested in dawdling in the souvenir shops; they wanted to get back out into the park quickly to go on more rides. As a result, Dare installed more POS systems in the theme park shops so that visitors could be moved along faster.

At Sutter Health, Hummel and his IT staff assumed that doctors (whose average age within Sutter Health is 60) didn't want technology and that they'd balk at security measures. But when they surveyed physicians, they found that the doctors were using E-Trade and doing online banking at home. In fact, the doctors wanted more technology; they wanted the convenience of accessing patients' medical records and lab results from home. But they were worried that shifting to an electronic records system would initially slow things down in the office. Although productivity did drop when Hummel's group gave doctors online access to medical records, within a few months things were back

Your Staff Should Press the Flesh Too

I.T. EMPLOYEES AT ALL LEVELS CAN BENEFIT FROM REACHING OUT TO CUSTOMERS

CIOs shouldn't be the only ones who venture out on the front lines. Indeed, at many companies, all IT employees are encouraged to get out and talk to customers.

At Sutter Health, CIO and senior vice president of IS John Hummel tells his direct reports to leave the office at least three days a week and spend at least two days a year inside a hospital or clinic. "I expect them to be in the field working directly with one of our affiliates or in off-site meetings with one of our customer groups," he explains. "With all the competing needs for capital and resources, we have to be visible and be good salesmen for our product."

Hummel also encourages IT employees at all levels to take part once a year in the "Nurse for a Day" program, spending a day following a nurse around or working alongside their IT counterparts in the field. He believes that if a network engineer witnesses the impact when a paperless hospital loses access to electronic patient records, he'll think twice about just rebooting the system without warning.

"You could easily ensconce yourself in the data center and never come out," says Hummel. "It's important to remember that the person on the other end of the computer is a patient, and someone's life hangs in the balance. If you forget that, you can cause someone harm."

At Wal-Mart, it's part of the company's culture to obtain firsthand customer feedback. Indeed, many corporate employees—including those in IT—help out in stores at peak holiday times, in part to witness the customer experience. IT employees are encouraged to document their observations by e-mailing a trip report to the appropriate IT teams. Carol Mosely, a vice president of IS, says that IT developers have always been required to talk to customers both before they start designing or modifying a system (to find out what customers really want) and after they roll it out (to find out how customers like the end result so that they can tweak it further if needed).

At Tussauds Group, Group Head of IT Chris Dare feels so strongly about the importance of acquiring a firsthand glimpse of the end customer experience that he's made it a key performance indicator for all IT employees to spend at least two days a year in a frontline role.

Those who don't, forfeit part of their bonus.

–A.D.

up to speed. Hummel worked with Sutter executives to make sure the physicians would not be punished financially for adopting the technology and temporarily seeing fewer patients. As a result, patient and physician satisfaction increased.

Surveys and focus groups helped debunk other mistaken assumptions on IT's part. It turned out, for instance, that patients were more interested in going online to refill prescriptions and schedule doctor visits than to pay bills. After all, patients are not responsible for most of their medical bills; insurance companies are. So Hummel concentrated first on enabling online prescription refills and appointment scheduling through a patient portal. Online payment moved lower on the priority list.

Hummel has been going on rounds with doctors ever since he became a CIO in 1990. "You can find an awful lot by being out there on the floor," he explains. "It's a pretty good way for me to go out there and really connect [with physicians and patients]. If you sit in the old ivory tower at corporate headquarters, you're just not going to understand what their pain is."

Once you know what's really going on in the customer's world, you can spot opportunities to improve customer service. While visiting Sutter hospitals, Hummel saw nurses struggling to incorporate a new medication bar-coding system into their routines. (The system lets nurses scan bar codes on the medication bottles, the patient's armband and their own ID badge to make sure the right patients are receiving the appropriate dosage.) He noticed that it was awkward for them to have to push a cart with a computer and bar-code reader from room to room; if a nurse needed to respond quickly to a patient, the cart got abandoned. He decided it was worth putting a wireless PC at 5,800 bedsides, an investment he calls "a healthy chunk of capital." As soon as Sutter began rolling out the bedside PCs, nurse acceptance of the bar-coding system increased dramatically, and those who hadn't yet gotten bedside access to the system started clamoring for it. Hummel even observed a patient insisting on being placed in a bed next to a PC because he said bar-coding made him feel safer. "I don't know why or how," the patient told Hummel. "But by God, I know it's safer."

ANOTHER PLUS: MAKING OR SAVING MONEY

Sometimes interacting with customers generates ideas that save the company money or time. Dare's work on the front lines at Tussauds'

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parks made him realize that the phone was an inefficient medium for requesting the transfer of stock from the warehouse to the retail outlets. He implemented a system to allow team leaders to reorder stock electronically on a POS terminal. Dare says that a month into the 2004 season, the new system seemed to be making it easier for employees to keep gift shop shelves fully stocked—and thus to avoid disappointing customers.

Carol Mosely, a vice president of IS at Wal-Mart, says she's in a Wal-Mart store an average of four days a week, observing or talking to customers, or shopping herself. Being in a store so often allowed her to verify feedback that the customers were becoming more familiar with the self-service checkout system and that it could be streamlined. After the machines had been in use for several years, Mosely observed that the self-checkout instructions built into the original system were slowing customers down. So Wal-Mart simplified the instructions and rejiggered the equipment so that the receipt prints out directly beneath where customers sign the credit card authorization. Mosely reports that customers are now getting through faster and that usage of self-checkout has expanded, enabling Wal-Mart to keep its labor costs down.

> Knowing firsthand **what will make customers happier** can provide powerful justification for IT investments and bolster your funding requests.

It's not always IT things that CIOs should be on the lookout for. When Les Duncan was CIO of Express in the early to mid-1990s, he regularly came up with ideas to improve sales during the two days he spent each month working at the San Antonio store. One January, a customer asked Duncan, who is now CIO of Atmos Energy, what the original price on a sale item was. Meanwhile, the executives at headquarters were scratching their heads trying to figure out why the post-holiday sale items weren't selling. Duncan realized that the sticker gun used to mark down prices was obscuring the original price. "The customer didn't know that she was buying a $75 sweater for $20," he recalls. Once shoppers could see they were getting a bargain, merchandise started flying off the racks. When he reported his discovery to the management team back at headquarters, the CEO chided Duncan's colleagues, "I don't know why the IT guy has to find this stuff." The fact that he often did boosted Duncan's credibility in the executive suite.

CUSTOMER OUTREACH HELPS YOU JUSTIFY IT

If you still aren't convinced that you need to make time to rub elbows with customers, consider this: Knowing firsthand what will make customers happier can provide powerful justification for IT investments. For four years, Bud Mathaisel, senior vice president of information services for Solectron, an electronics manufacturer and integrated supply chain service provider, served as the global account executive for a major customer on top of his regular IT job. As a result, he was able to bolster funding requests for IT projects by citing conversations he'd had with customers in the course of managing that account. "It helped when justifying investments in such things as B2B to cite specific examples from my own account," he says. "It gave me personal credibility." And when he needed approval for enterprise application integration technology, he was able to relay that his customer had told him how useful it was that Solectron could provide that company with a single view of its supply chain—and that none of Solectron's competitors had that capability. Wet Seal's Relich won support to install DSL in stores because he could stand up and say that he had seen with his own eyes credit card authorizations taking an agonizing six to seven seconds to process via existing dial-up connections. Now that stores have DSL, authorizations whiz through in less than two seconds.

At the Tussauds Group, regular customer surveys ask visitors to rank on a scale of one to 10 how much "queues spoilt my day." But Dare can vouch that scanning survey results is far less compelling than talking directly with frazzled parents at the end of a day spent in lines with antsy tots. Armed with such direct customer feedback, he became the driving force behind a decision to invest more than a million pounds to roll out Fastrack technology in three of the company's four theme parks. By purchasing a Fastrack ticket either online or at the gate, customers can now scan their ticket at a ride's turnstile and get a slip guaranteeing a wait of less than 20 minutes if they return during a specified time window. A month into the season, Dare says that the ranking for the category of "queues spoilt my day" had already dropped one point.

As he prepares to spend a day mingling with tourists at Warwick Castle, Dare remains convinced that his monthly stint at the front lines is a good investment. "Everyone is short on time, but what you get out of it is well worth it," he says. And after all, he adds, "it is a day out of the office." CIO

Ask the Source

John Hummel, CIO of Sutter Health, spends more than a third of his time with patients and clinicians. He even scrubs up to observe procedures in the operating room. How far should you go to get to know your customers? Hummel can help you figure it out. He's answering your questions right now at **ASK THE SOURCE**. Go to ***www.cio.com/ask***.

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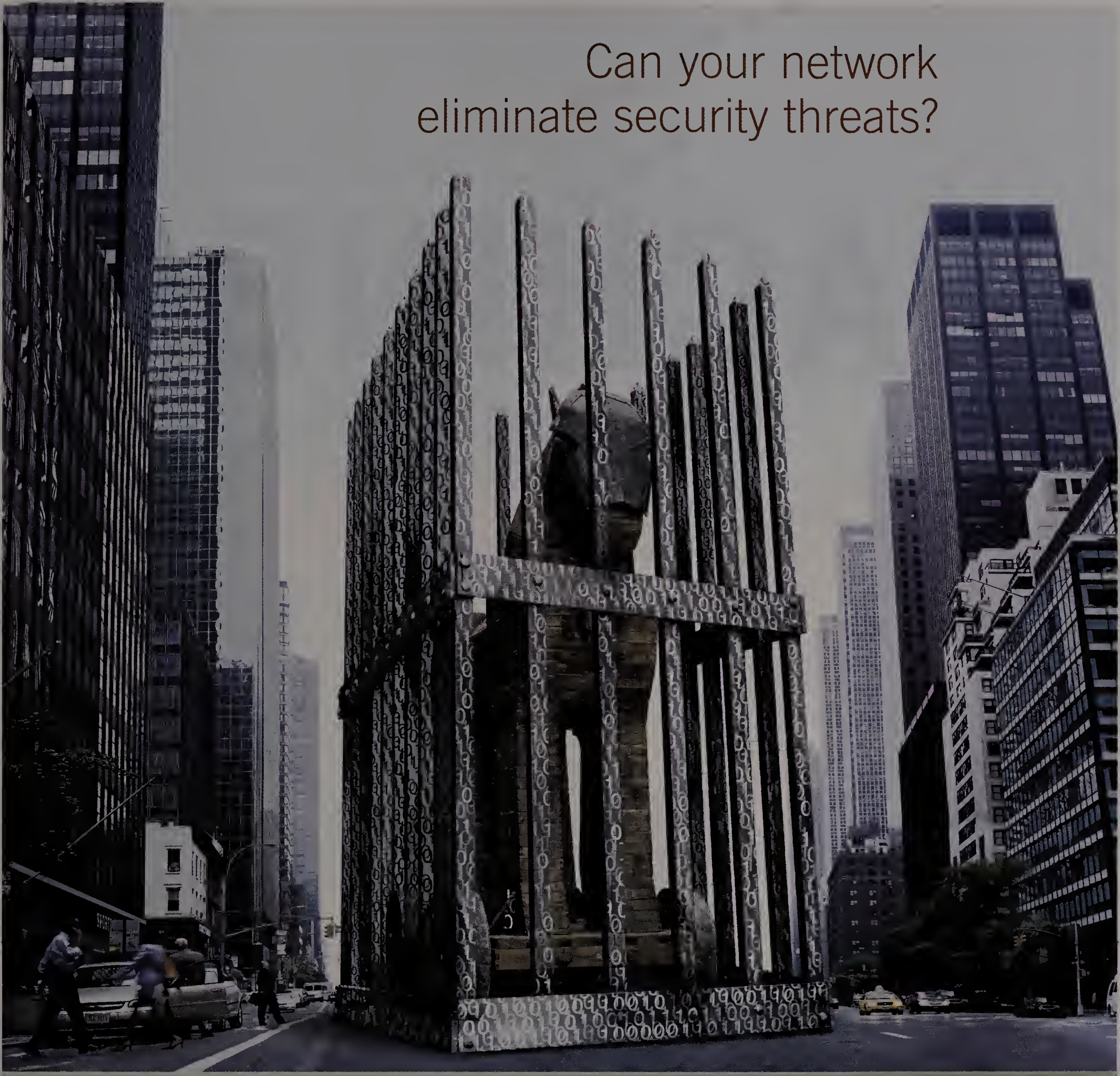

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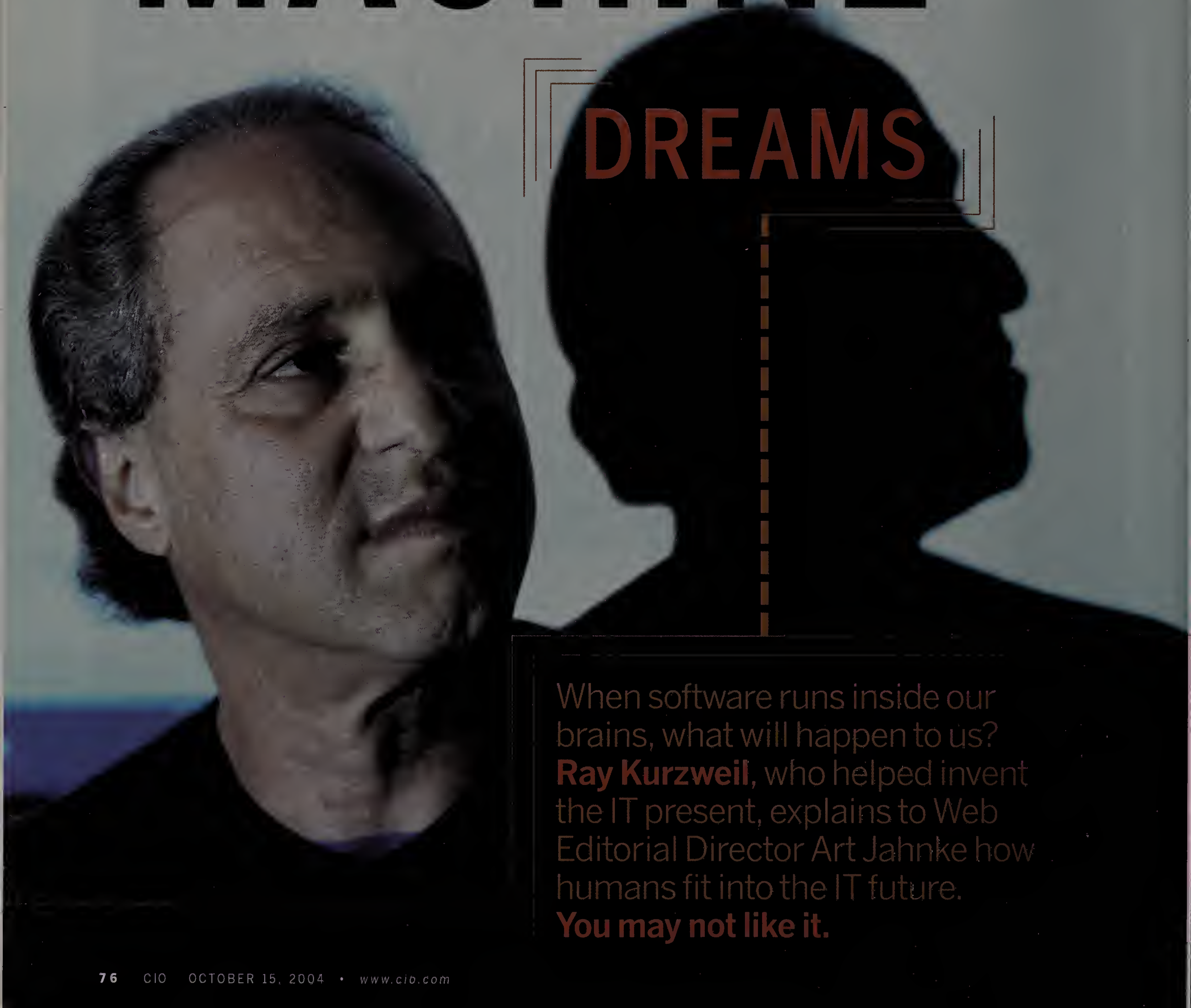

When software runs inside our brains, what will happen to us? **Ray Kurzweil**, who helped invent the IT present, explains to Web Editorial Director Art Jahnke how humans fit into the IT future. **You may not like it.**

RAY KURZWEIL GREW UP IN QUEENS, N.Y., where, he says, schoolwork was never so challenging that it kept him from doing what he really wanted to do: build computers.

That was also the case at Kurzweil's next school, MIT, where the young student skipped so many classes to work on inventions that his classmates nicknamed him The Phantom. They should have called him The Natural because, as it turns out, Kurzweil is an intuitive inventor.

He helped invent the first optical character reading technology, the first text-to-voice synthesizer, computer-based musical instruments, and the first large-vocabulary speech-recognition system. His inventions have made him famous. He has founded several companies and written hundreds of articles. He has also authored and coauthored a number of books, including *The Age of Spiritual Machines: When Computers Exceed Human Intelligence*, and the forthcoming *Fantastic Voyage*, which he cowrote with Terry Grossman, founder and medical director at Frontier Medical Institute.

In recent years, Kurzweil has shifted from inventing technologies to tracing the arc of technology progress. Want to know how technology will change our lives, our jobs and our bodies over the next two decades? Kurzweil is a good person to ask. So we did.

CIO: Recently we've been hearing about increases in productivity without a corresponding increase in jobs. Could technology continue to improve productivity without creating new jobs?

RAY KURZWEIL: This is part of a process that began at least 200 years ago, when we automated the English textile industry. You had a machine that could replace 10 or 20 or 30 weavers. But the resulting prosperity from automation created whole new industries. We had industries to create machines and maintain them. Demand increased for things the machines made. The common man or woman didn't want just one shirt, and so on.

The broad history of automation shows that we have actually increased the number of jobs. One hundred years ago, we had about 30 percent of the potential workforce employed; we now have about 60 percent. Wages, in constant dollars, have increased by a factor of six to eight over the past century.

Can we expect that trend to continue?

The relative wealth that we now have comes from productivity, and we're going to see dramatic productivity enhancements in the future. If you jump ahead 20 years or so, we will be able to create virtually any physical product at almost no cost, just from information and fabrication techniques. In fact, we're not that far today from being able to create physical products with software because we have computer-assisted inventory control systems, just-in-time procurement, computer-controlled movement of materials and assembly.

Everyone agrees that increased productivity is great, but what about increased productivity without an increase in jobs, which is what we've been seeing recently?

Right now we're dealing with relatively small unemployment in the United States—about six percent—and we're seeing a reallocation of jobs around the world. National boundaries don't count as much as they used to. It used to be that you had to be in New York to work in New York. But now that we can really work effectively in cyberland, we have a reallocation of mental work. In terms of the world economy, that's a positive thing. It's not a zero-sum game. Just because India and China benefit doesn't mean that's to our detriment. But these types of trends do have short-term dislocations, so there may be some short-term issues with employment.

What about the longer term?

We're seeing international competition for the first time in types of work that require education and skills, and that's going to continue. And I think it's a good thing. China is committed to building 50 MITs, as they put it. That's not an exaggeration. They're creating scores of world-class technology universities. But these people are going to create intellectual property from which we'll all benefit. If somebody creates a breakthrough in bioengineering, we all benefit. It may also result in China respecting intellectual

PHOTO BY CHRISTOPHER HARTING

> "A lot of the equipment that IT departments concern themselves with now—routers and servers—it's all going to be gone. There won't be computers on desks. **We're going to eliminate most of that clutter."**

property more, if they are heavily invested in creating intellectual property. Still, I believe the United States retains an edge in terms of innovation. We still lead the world in terms of creating new paradigms, new business models, new ways of creating products.

Speaking of new models, what will be different about the IT department 10 years from now?

Let's look at a few trends. A lot of the equipment that IT departments concern themselves with now—routers and servers—will all be gone. There won't be computers on desks. We'll eliminate most of that clutter, certainly by the end of this decade. Technology will be very mobile; it'll be so small that it'll be virtually invisible. Everybody will be online. Images will be written right to our retinas. We'll have very high-speed bandwidth connections at all times. The computing substrate will be everywhere.

So, what will the IT department be doing?

It will be concerned with security, privacy and protection—particularly protection against software pathogens. These are important issues today, but they're going to be the profound issues civilization struggles with in the future. Eventually, we're going to have software processes running close to our bodies and, ultimately, *inside* our bodies, in our brains, so detecting pathogens is going to be extremely important.

I also think information professionals should take a broad view of the power of information, because information will be the only thing that has value to the corporation. Consequently, there will be no more important department than the information department.

What about people? What will we be like? What will we be doing?

Technology progresses at an exponential pace because we use the latest generation of technology to create the next generation. That's a process that began with biology. It took billions of years to create DNA, but once it had evolved an information processing capacity to store and record the results of evolutionary experiments, the DNA could use that for the next stage. That was the Cambrian explosion.

We see that also in technology. The first computers were designed with pen on paper, and they were put together with screwdrivers and wires. Today, a designer sits down at a workstation and puts in formulas that look very much like software programming. The chips are laid out automatically and fabricated automatically, so the process takes days or weeks rather than years. That's why the products of technology grow exponentially in price, performance and capability. So the creation of technology is already very much a collaborative process between humans and machines.

I think it's important to understand that technology and human civilization are deeply integrated and that that integration is going to become more intimate. We're getting closer to our computers. I was talking to a woman yesterday who said her 10-year-old son's notebook is an extension of him. She said it might as well be inside him. Well, soon computers *will* be inside us. Within one to two decades, we will be able to place nonbiological intelligence inside us, noninvasively.

By the 2020s we will be placing millions or billions of nanobots—blood cell-size devices—inside our bloodstream to travel into our brains and interact with our neurons. We will be extending our cognitive capability directly through this intimate merger of biology with machines.

Right now, there's a restricted architecture to the way our brains work. The brain uses electrochemical signaling for information processing, and that's a million times slower than electronic circuits. You can make only about 100 trillion connections in there. That may seem like a big number, but the way in which we store information is inefficient, so that a master of an area of knowledge can really remember only about 100,000 chunks of knowledge. If you use Google, you can already see the power of what machines can do. In the future, we will be able to expand the 100 trillion connections we have with new, virtual ones. Once nonbiological intelligence gets a foothold in our brains, it will grow exponentially. As we get to the 2030s, human beings will have biological brains enhanced with more powerful nonbiological thought processes.

So the answer to your question is, if we remain unenhanced, if you just had machines developing on a distinct track, they would surpass humans. But that's not what's happening. We are merging.

As technology changes our world—and us—that radically, won't we suffer shock upon culture shock?

No. It's a very smooth process. If I describe the world of 2030, it would seem quite different from the world today, but we get from here to there in 200 little steps. Each step is benign and conservative and makes sense and addresses some compelling need.

Of course, there's already a reaction to this change. We see a

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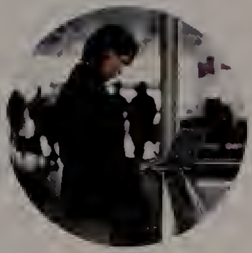

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strengthening of a kind of antitechnology movement. There is basic philosophic debate about whether we are intended to be masters of our world or whether the world should master us, whether we should fit into the so-called natural order.

My view is, what's unique and compelling about human beings is that we seek to surpass our limitations. Other people would rather celebrate our limitations, but we didn't stay on the ground. We won't stay within the limits of our biology.

I plan to expand my intelligence along with the available machine intelligence.

Aren't you smart enough now?

Absolutely not. Are you kidding? A major focus of my interest is in tracking technology trends, which requires me to get my intellectual arms around a lot of diverse fields. It's really an opposite activity to what a lot of scientists do, which is to become more and more narrow. So I'm a neophyte in just about every field I run across.

You seem to have unbounded faith in the power of machines to help us, yet recently there's been talk of failure, especially in biotech. No cures for cancer. No cure for AIDS. Has technology let us down?

That's complete nonsense. We're in the early stages of biotechnology. We just finished the genome. We haven't finished reverse-assembling it yet, and we don't understand how the genes express themselves in proteins. Just now, we're getting machines powerful enough to simulate protein folding. We're learning the information processing methods underlying biology, disease and aging. We're finding very finely tuned interventions to reverse aging and to reverse disease processes. And there are very profound biotechnology-based therapies in the pipeline already. There are drugs in the pipeline that will enable us to eat as much as we want and remain slim, that will reverse type-2 diabetes by getting rid of excess glucose. I'm very confident that over the next decade we'll largely eliminate the diseases that kill 95 percent of people today. We've identified a dozen or so aging processes, and we have strategies for reversing them all. I believe that within 10 years we'll produce a mouse that doesn't age, and we'll translate that into human therapies within another five to 10 years after that.

> **"We have a lot of outmoded programs in our genes.** One says, 'Hold on to every calorie because the next hunting season might be fallow.' These are all programs that need to be changed."

Do you think that someday there'll be legal limits on how long people can live?

Not if I have anything to say about it. But there's a very powerful "death-ist" need. People really have it deeply ingrained. Life is short. You can't live forever. The only things that are certain are death and taxes. We have this whole so-called normal lifecycle; certain things happen at certain ages. We've rationalized death, which in my view is a profound tragedy and a tremendous loss of knowledge and expertise. And we have rationalized it as a good thing. I guess if there's nothing you can do about it, the best thing you can do is rationalize it, but there will be things that we can do about it.

I have a book coming out in the fall, *Fantastic Voyage*. And in it I say that right now we have the means to slow down aging to such an extent that even baby boomers like myself can remain healthy and vital long enough for the full blossoming of the biotechnology revolution, at which point we will be able to rebuild our bodies and brains.

You look like you're in good shape.

Well, I take this very seriously. I'm very aggressive in terms of reversing aging, or slowing down aging. I recently took a biological aging test with my health collaborator (who is also my coauthor), and based on 20 different tests—memory and sensory acuity and response times—it had me at age 40. I'm 56.

What do you do to slow the aging process?

I eat a certain diet. I take 250 supplements a day. I'm really reprogramming my biochemistry. A lot of people think it's good to be natural. I don't think it's good because biological evolution is not on our side.

It's in the interest of our species for people past child-rearing age not to stick around, at least in an era of scarcity, and our biological program hasn't changed since we lived in an era of scarcity. We have a lot of outmoded programs in our genes. One says, "Hold on to every calorie because the next hunting season might be fallow." These are all programs that need to be changed. We have a lot of aging processes that really accelerate when we get into our 50s and 60s, and I'm working aggressively to reverse those.

Who needs a bunch of 120-year-olds hanging around, especially when so much knowledge will be stored in machines?

Well, ultimately, there's going to be very little difference between a guy who's 120 and a guy who's 30. And with so much of our lives spent in virtual reality, we'll able to express ourselves in many different ways. It's not a matter of the knowledge that a 120-year-old would have. We all have an opportunity to create knowledge, and we'll expand that opportunity, which, I think, is really the mission of our civilization.

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As CIOs become responsible for consolidating voice and data, they need to look for ways to save money

Bandwidth Bang for the Communications Buck

BY GALEN GRUMAN

COST CUTTING | The convergence of communications—both data and voice—has placed many CIOs squarely in the role of communications manager, like it or not. "Once you've converged the networks, you need one person to manage that infrastructure," says Ovum analyst Marc Jacobson. But this consolidation offers opportunities to get the most bandwidth for the company's communications buck.

For example, Anthony International, a manufacturer of refrigeration equipment, reduced its carrier data and voice bills by 40 percent during a one-year period using network services from BTI Communications Group. Anthony combined several techniques, recalls CFO Michael Stewart. It began using the public Internet and virtual private networks (VPNs) in place of dedicated and leased lines to carry data on its five-building campus and among more than a dozen sales offices; it added voice-over-IP (VoIP) phones to its IP-enabled phone switch for about 50 users in both local and remote offices, and it consolidated its telecom providers from 50 to just two.

Take the time to examine your own situation, implement one or more of the strategies suggested below, and your savings might be just as significant.

The fastest way to cut down on voice and data costs is to consolidate your telecom contracts. Using the fewest national and regional carriers possible decreases management overhead and can increase savings through volume discounts. "Negotiate your contracts each year for a 15 percent savings right there," advises Bryan Van Dussen, a Yankee Group analyst.

Krispy Kreme Doughnuts, for instance, consolidated its long-distance voice carriers several years ago, going with MCI. But it was able to save an additional 50 percent this spring by moving from MCI to Qwest Communications, which also provides Krispy Kreme's data service, says Sam Gray, director of technical services at the doughnut maker. Dan Luczak, CIO of commercial printing equipment manufacturer MAN Roland North America, has followed a similar strategy. "Our voice and data services come out of the same bucket, so I can leverage that [combined volume] for more discounts," he says.

> Communications providers can make mistakes, such as charging the wrong rates, charging for unused bandwidth and incorrectly applying tariffs.

Krispy Kreme's Gray has also hired KMC Telecom to provide the company's roughly 1,000 phone lines at about 200 locations. It's still not clear if this will reduce monthly local-service expenses, but the company was able to avoid hiring a new technical services person. He's reducing costs further by hiring Cybera to deploy DSL service as the last-mile data connection to stores in markets where DSL is available. This is at least 50 percent less expensive than standard local-loop T1 connections and well worth the lower uptime (about 98 percent) of DSL, he says.

Companies can often find savings by reviewing their contracts and billings diligently, either themselves or via service providers. Communications providers can make mistakes such as charging the wrong rates, charging for unused bandwidth, charging for services that were neither ordered nor provided, and incorrectly applying tariffs. HCA, for example, saves between 15 to 30 percent of its monthly telecom costs just by reviewing the bills for its 200-plus facilities, says David Adams, HCA's assistant vice president for data and voice network services. HCA's six-person telecom management staff does its own analysis using tools from MBG and Universal Data Solutions, but many firms outsource such tasks to service organizations such as ISI Telemanagement Solutions, QuantumShift, Stone-House Technologies, Symphony Services, Veramark Technologies and others that hunt for savings in return for a finders fee.

MAN Roland, for instance, saved about 20 percent on its telecom bills by hiring ISI Telemanagement Solutions to identify billing errors, says Luczak, and half the errors were for recurring charges that showed up on each month's bill. For example, MCI kept billing a $2,800 monthly access charge that should have been just a few hundred dollars, he recalls, while for 30 months Sprint overbilled the PBX-to-ISDN connection charges. Luczak says a company such as ISI can play hardball better with the carriers when disputes arise because it has the expertise and databases of carrier program costs to effectively identify and prove mistakes. That expertise also lets ISI advise Luczak on more cost-effective ways to approach his contracts.

Whatever the savings, it's important to keep reviewing so errors don't recur. "They creep back in," says Mark Blasing, director of voice and data communications at La Quinta

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Mobile IP on the Horizon

Carriers and telecom equipment makers are working on ways to end the distinction between a wired desk phone and a mobile phone. This summer, several carriers and equipment makers formed the Fixed-Mobile Convergence Alliance to develop standards for PBX-type systems with handsets that would handle calls seamlessly between local and wide-area networks, both wireless and landline. Meanwhile, Japan's NTT DoCoMo has introduced cell phones that work with voice over IP in the office but switch to cellular networks outside.

In the United States, T-Mobile and Hewlett-Packard have announced a cell phone-PDA device that can send data over the cellular network and over a Bluetooth or Wi-Fi network, switching among them as needed. That service doesn't support voice calls, although it could if users installed their own VoIP clients and access points. Scott Ballantyne, vice president of business service marketing for T-Mobile USA, says it will be at least mid-2005 before VoIP has both sufficiently consistent quality and standardized connection protocols to be installed on a mass-market business device.

Providers see a natural consumer market for such service, since cordless phones are already very common. But the business benefit of this convergence is less obvious. Mobile IP capability "will be a bonus, not a decision point," says Dan Luczak, CIO of commercial printing equipment manufacturer MAN Roland North America. Gartner analyst Bob Hafner concurs: "I can see using Wi-Fi for data, but as an alternative for voice, it's a pretty convoluted process to save a few cents. Flat-rate cellular will kill this." *–G.G.*

Simplify IT Management

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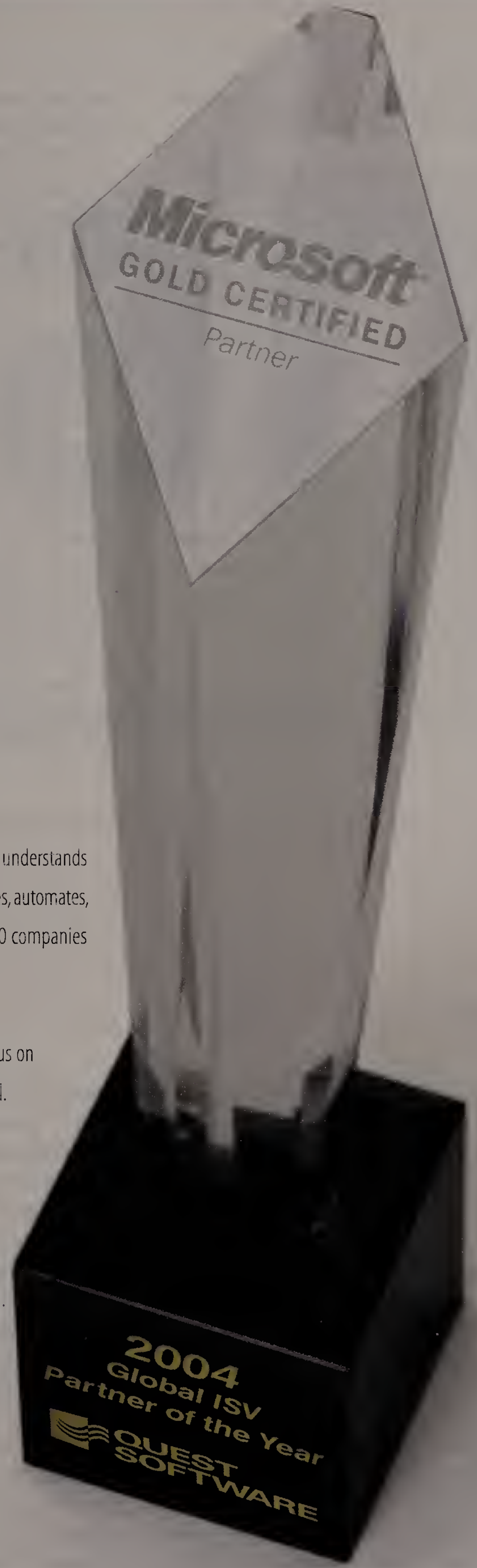

Inns, so the company hired Symphony Services to review its bills each month.

Go Beyond Frame Relay and T1

Enterprises can reduce their facility-to-facility data transport costs by replacing traditional conduits—such as dedicated T1, ISDN and frame-relay lines—with the public Internet, leased Ethernet and other high-speed data connections. Such technologies typically increase available bandwidth by 10 to 40 times at about one-third the per-megabyte cost.

New York-based E-Trade Financial, for instance, uses a VPN to connect its 12 campuses and branch offices over the public Internet. E-Trade CTO Joshua S. Levine says an analyst study of E-Trade's deployment showed it pays just 70 percent of what its peer group pays for data links. Likewise, MAN Roland is saving $5,000 per month by replacing frame-relay connections to six facilities with VPN connections over the public Internet. MAN Roland's Luczak says the change will pay for itself in 15 months, even with the additional routers and switch upgrades that were required. He expects further savings as he drops the ISDN lines that now carry videoconferences.

> Penske replaced its frame-relay connections with DSL and cable-modem service, upping bandwidth from 56Kbps to as much as 1.5Mbps, while reducing costs by 70 percent.

Krispy Kreme took a different path when its T1 lines could no longer handle the increasing data traffic among its various Winston-Salem, N.C., facilities. Technical Services Director Gray replaced the T1s with leased metro-area Ethernet service from Time Warner Telecom. Gray's costs tripled, going from $500 per month to $1,500 per month per location, but his bandwidth shot up 70-fold from 1.5Mbps to 100Mbps. Gray says he would have needed to deploy multi-linked T1 or T3 lines (which are difficult to install and manage, and would have cost far more than his current approach) to achieve the same bandwidth. The added performance also let the company stop using Citrix Systems' terminal emulation tools to run applications over the slow T1 lines. Terminal emulation forced users to log into a Citrix server, a process that resulted in increased management overhead and help desk calls from frustrated users. All Krispy Kreme facilities with metro-area Ethernet connections now run corporate applications locally, connecting back to corporate data stores over the high-speed connections. In fact, Gray was able to begin moving his network operations from the headquarters to a more secure, larger space at a nearby manufacturing center without slowing data or applications access at the home office.

In addition to lower bandwidth costs, enterprises can look for managed private IP VPN providers that can eliminate the management overhead of handling multiple network providers, advises Yankee Group's Van Dussen. "You can do away with a lot of suppliers." For example, Penske Truck Leasing hired GoRemote Internet Communications to choose and manage broadband providers, giving it one point of contact. Penske replaced its frame-relay connections with DSL and cable-modem service, upping bandwidth from 56Kbps to as much as 1.5Mbps, while reducing costs by 70 percent, says Jerry Hodgen, manager of LAN, WAN and desktop services at Penske. It took just three months for the change to pay for itself, even figuring in the cost of new VPN-capable routers at each location. So far, about half of Penske's 800 locations are using broadband, and Hodgen expects that number to increase as DSL and cable-modem service spreads.

> Business broadband **doubled** to **10 million** lines between 2002 and 2003, and will **exceed** **35 million** lines in 2008
>
> –The Yankee Group, 2004

Phase In IP Telephony

IP-based telephony can significantly reduce costs, says analyst Van Dussen. "IP based telephony reduces administrative, networking and IT support costs while also increasing productivity. Savings or TCO reductions differ company to company, installation to installation, but it is common for early users to save enough to fund its installation," he notes. But the greatest savings come from deploying VoIP in new sites and in full-replacement installations (see "IT, Phone Home," *www.cio.com/printlinks*). Most enterprises can't afford to replace their PBX systems outright, but they can still benefit from IP telephony implemented incrementally: Most PBXs from the last 10 years support IP interfaces—including those from major providers such as Avaya, Mitel Networks, Nortel Networks, and Siemens—so communications managers can connect new users and facilities via IP while sharing most of the PBX functions such as four-digit dialing and voice-mail access. Already, Van Dussen says, approximately 10 percent of all enterprise voice traffic in the United States is bypassing the public phone network, largely due to VoIP adoption and the use of private networks.

Florida Atlantic University CIO Jeff Schilit has replaced T1 voice lines among his seven campuses spread out over 150 miles and now

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runs voice traffic over a high-speed optical network that also carries data traffic. This saves the university $75,000 a year, and Schilit expects to save more when he moves his videoconferencing service from separate ISDN lines to the central data network. But Schilit will keep his existing Siemens telephone switch in place, since it is only two years old and should last at least seven more years. "When it's time to replace it, we'll make the move to native [IP telephony]," he says.

IP telephony doesn't cost significantly less to place calls outside the PBX than traditional telephone systems, notes Ovum analyst Jacobson, until you add in the savings from taxes and tariffs that VoIP providers don't have to charge. But at the behest of the regulated carriers, the U.S. Senate is considering a bill to make VoIP providers charge these tariffs and taxes as well. The Federal Communications Commission has exempted from taxes and tariffs only those VoIP calls that completely bypass the regulated phone system, and has no position on calls that transit partially through that system. To be safe, however, enterprises should not justify the cost of their IP telephony investments on tax and tariff savings alone, advises Ronnie Johnson, national telecommunications contract administrator at HCA.

Analysts and vendors also tout IP telephony's potential to run applications, such as displaying client information onscreen automatically when a client calls in, or managing voice mail, e-mail, and even instant messaging over one network and across multiple devices. CIOs see that potential, but "the new IP phones don't have a real application yet," says Luczak. Their immediate benefit is a lower cost to connect campuses to each other by replacing trunk lines and connecting users within a campus by replacing or augmenting PBXs. If it comes true, the promised potential of new IP applications will be just icing on the cake.

San Francisco-based freelance journalist Galen Gruman can be reached at *ggruman@zangogroup.com*.

UNDER DEVELOPMENT

Cool Fuel

HIGH-TECH ENERGY | We're still a dog's age away from the "hydrogen economy," but fuel cell researchers continue to make strides. This past summer, the University of Houston announced a process to create "cool" fuel cells that operate at about one-half the temperature of similar cells, while providing more energy per cubic inch.

Researchers at the university's Texas Center for Superconductivity and Advanced Materials (TcSAM) have developed a way to create thin-film solid-oxide fuel cells (SOFCs) that could be more efficient than today's power plants (up to 65 percent compared with 30 to 35 percent for traditional methods such as burning oil), while releasing less heat and costing less than other SOFC designs. According to the school, the technology would provide all the power necessary for a typical house from cells no larger than a pair of soda cans. Better yet, the cells would run at an almost reasonable 450 to 500 degrees Celsius—roughly half the temperature of current SOFCs—allowing designers to build the critical cell structures out of stainless steel instead of more exotic materials. The cells could also be smaller because of their reduced insulation requirements.

The initial goal, says Alex Ignatiev, director of TcSAM and a multidiscipline professor at UH, is to create high-efficiency fuel cells for military and space exploration purposes, where the still-scorching operating temperatures and high cost (around $1,000 per kilowatt of output) won't be a serious deterrent—especially if the alternative is carrying around heavy, bulky, short-lived batteries. But Ignatiev says he expects that the costs could come down by a factor of 10 if the cells go into mass production. At the lower price level, he envisions homes generating their own power from a garage-based fuel-cell power plant, with the homeowners selling back excess energy to the utility companies.

That vision is a few years off at least, though. The cell technology is now in its early stages, with testing to begin in the next few months and beta test cells in operation after about two years.

–Christopher Lindquist

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Painful as it is, Sarbanes-Oxley may be a kick in the pants that IT needs.

–Eric Knorr

The Bitter Pill

Regulation has come to town, and IT will never be the same

BY ERIC KNORR

LEGISLATION | For better or worse, laws and regulations define the operating environment of business. And now, thanks to companies that thought they could sneak around accounting rules, IT finds itself directly exposed to government regulation like never before. In particular, the rules governing document retention, security and retrieval have changed forever. If you work for a public company, you're probably just recovering from (or still scrambling to meet) the Sarbanes-Oxley Section 404 deadline in November. The pain has been intense mainly because the mandate affected applications and systems scattered throughout the enterprise.

Painful as it is, this may be a kick in the pants that IT needs. After all, business rules are business rules. When the business side asks for changes under normal circumstances, IT can deal with them piecemeal. But when a disaster such as Sarbox strikes, the pressure becomes overwhelming to create a flexible, overarching framework to control diverse systems and applications, one that will have the beneficial effect of making IT more agile overall.

Call it the application layer of "on demand" or "utility" computing. Just as we would love to have servers that reprovision themselves on the fly based on shifting demands, so the entire arsenal of enterprise applications needs to be more malleable when the rules change.

I think several classes of software can help make business logic and process logic easier to change without recoding or upgrading. Let's start with business process management (BPM) software. I think of this category as "workflow with teeth," a development environment where you can actually build meta-applications from existing applications. This goal assumes a level of application integration that may not yet exist—and admittedly, that's the hard part (and explains why the enterprise application integration vendors were the first to promote BPM). But much of the point of BPM is to distill process logic from existing applications and make it easy to change.

Once you've used a BPM system to model processes and code process objects, you can rearrange those objects at will according to rules you've established. There are dozens of solid BPM players, including Intalio, Lombardi Software, Metastorm, Pegasystems, Savvion and Ultimus. Staffware, recently bought by Tibco, stands out for its vertical industry solutions. And a company called Fuego has made a name for itself by creating a BPM variant specifically to address Sarbanes-Oxley.

Most of the companies I've talked to that are implementing BPM are also rolling out a business rules management system (BRMS). With a BRMS, the idea is to avoid hard-coding business logic into applications. Instead, you put it into a container where it can be manipulated by business analysts. For example, let's say a regulation stipulates that a transaction over a certain dollar amount must be reported immediately to the Fed. Then some government so-and-so decides that number should be lower. With a BRMS, you could make the change overnight without recoding.

The rules engines experts I've talked to agree that the BRMS systems best suited to enterprise deployments are Blaze Advisor and ILOG JRules. But Corticon Decision Management Platform is getting some traction, thanks mainly to a spreadsheetlike interface.

Global rollouts of BPM and BRMS won't happen overnight. And many IT shops have been forced into point solutions to meet Section 404. But some of the thinking about how IT should approach compliance can be applied more generally. If you haven't read "IT Control Objectives for Sarbanes-Oxley" by the IT Governance Institute, you should. It includes a whopping understatement: "Many of the IT professionals being held accountable for the quality and integrity of information generated by their IT systems are not well-versed in the intricacies of internal control."

It's tough to argue with that one. And the change management framework the institute goes on to describe has relevance beyond the dreary obligations of Sarbox. Yes, regulatory compliance has been hard to swallow, especially during a season of flat budgets and escalating business-side demands. But you know what they say about crisis and opportunity.

Eric Knorr is executive editor at large for *Infoworld*. He can be reached at *eknorr@pacbell.net*.

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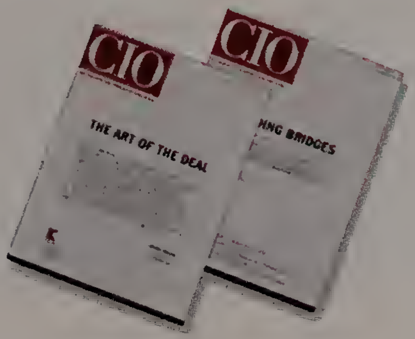

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EXECUTIVE Summaries

October 15, 2004

COVER STORY
How to Outsource-Proof Your IT Department: A New Game Plan

By Christopher Koch | **44**

There are aspects of IT—particularly coding—that are destined to move offshore. But there are other areas where internal IT has an advantage over outsourcers. CIOs who invest in those areas stand a better chance of retaining a healthy, functioning IT department tomorrow, even after IT's traditional currency of value—software code—moves to lower-cost providers. The future of the IT department lies in finding ways to improve work and to translate those improvements into technology. Reshaping IT in this image will require a new emphasis on all the things that come before coding: business process design, requirements analysis and envisioning architectures of data that make businesses run more efficiently. These changes will be difficult; CIOs must give developers training and time to transform themselves into designers, and emphasize collaboration between IT and business partners.

> **The new breed of IT developers will be "people who re-architect work to achieve better proximity to customers and can troubleshoot information-related inefficiencies. The people who can do this cannot be outsourced."**
>
> –RAVI ARON, ASSISTANT PROFESSOR, THE WHARTON SCHOOL, UNIVERSITY OF PENNSYLVANIA

Education: Degrees of Change

By Todd Datz | **54**

COLLEGES ARE GETTING THE MESSAGE from CIOs that the computer science grads they're turning out lack the business, analytical and communication skills necessary to manage projects and work with the business side. Consequently, some schools are beginning to rethink their curricula, which traditionally have focused on training kids to be programmers. For some educators, the new formula for producing the graduates that CIOs are looking for is: CS (computer science) + X (other areas of study, such as business, psychology, biology or art). But institutions of higher learning aren't built for speed. Even with the best intentions, changing the character and content of the computer science curriculum will take time. CIOs can help move things along by (among other things) joining a school's industry advisory council, participating in collegiate research programs and speaking to classes.

Knowledge Management: Less for Success

By Alice Dragoon | **62**

MANY ENTERPRISE KM PROJECTS begun in the past few years have failed, generating an unwillingness to undertake—or even address—KM issues. But KM can be a very effective tool if it's tied directly to discrete business needs and opportunities. By starting with targeted projects that deliver value quickly, CIOs can achieve the success that has proved elusive with those large, big-bang approaches. CIOs who have had success with KM advise focusing on creating value in a specific process area, or even just for certain kinds of transactions. It's relatively easy to develop metrics to track ROI for a discrete task. Start with one job at a time—preferably the most knowledge-oriented one—and build KM into a job function in a way that actually helps employees do their work better and faster, then expand to the next most knowledge-intensive job and so on. Once CIOs have achieved even small successes with KM, it's important to celebrate them to build a base of credibility and support for future efforts.

In the Loop with Customers

By Alice Dragoon | **68**

INTERACTING WITH EXTERNAL CUSTOMERS often sinks to the bottom of the priority list for most CIOs, as documented by *CIO*'s "State of the CIO" surveys for the past two years. Yet IT executives who make the time have found that rubbing shoulders with external customers yields enormous benefits. By opening a direct line of communication with customers, CIOs often get ideas about how to apply technology to improve service or cut costs—epiphanies they will never experience if they stay cooped up in their offices. Direct knowledge of customer needs also helps CIOs justify technology investments because they can personally attest to how such investments will make life better for customers. And IT executives win points with top management when they make observations outside the realm of IT that spark better ways of doing business. CIOs from retail, entertainment and health care discuss their forays into the customer's world, and report how they've made those excursions pay off.

ET: Bandwidth for the Communications Buck

By Galen Gruman | **83**

THE CONVERGENCE OF COMMUNICATIONS—both data and voice—has placed many CIOs in the role of communications manager. This consolidation will add to the CIO's workload, but it also offers opportunities to reap big savings for the enterprise. The fastest way to cut down on voice and data costs is to consolidate your telecom contracts. Using the fewest national and regional carriers possible decreases management overhead and can increase savings through volume discounts. Other strategies include: reviewing contracts and billings diligently (either by yourself or via service providers); replacing traditional conduits (dedicated T1, ISDN and frame-relay lines) with the public Internet, leased Ethernet and other high-speed data connections; and phasing in IP telephony.

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